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CITY ARITHMETICS

BOYLAN-SMITH

FIFTH YEAR - SECOND HALF

NEW YORK
CHARLES E. MERRILL CO.

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CITY ARITHMETICS

FIFTH YEAR: SECOND HALF

BY

WILLIAM A. BOYLAN
DISTRICT SUPERINTENDENT OF PUBLIC SCHOOLS
CITY OF NEW YORK

AND

FLOYD R. SMITH
PRINCIPAL OF PUBLIC SCHOOL 167, BROOKLYN

CHARLES E. MERRILL COMPANY
NEW YORK AND CHICAGO

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PREFACE

One noticeable weakness in elementary education of to-day is the pupil's inability to use a textbook correctly. The City Arithmetic is an effort to remove this weakness. The appeal is first and foremost to the pupil. The language used is within his comprehension; the explanations are such as he can easily grasp. The work advances step by step. The drill is ample and sufficiently varied, and the problems are within the experience of the average child. These are books which the pupils can use at home as well as in school.

Business men complain that boys and girls whom they employ cannot perform correctly the four fundamental operations. Teachers in the upper grades state that the pupils come to them so weak in addition, subtraction, multiplication, and division of integers that the work in the last three years is seriously handicapped. The authors feel that this is in part due to lack of persistent drill. To offset this, a large number of examples and problems in these operations has been furnished for daily practice.

Overemphasis on the explanation of processes and excessive variety of appeal to the interest of pupils are other causes of weakness in arithmetic. The authors have striven to avoid refinements of explanation, to eliminate processes with little practical application, and to provide an intelligent but not excessive variety of drill work.

Every teacher knows how heavy a burden is the organization of material. These books lift the burden. A moderate spiral is used. In the third and fourth years, the work has been arranged by weeks and with the greatest care. In the fifth and sixth years, the work has been arranged by months; in the seventh and eighth years, the arrangement is topical. Easy examples have been selected for the beginning of each term and the matter is presented in a way that avoids the usual stumblings and discouragements.

Type problems for each grade have been given to illustrate how particular methods are to be carried out and to show with how much detail each subject is to be presented.

Ample material for oral drill has been furnished, and a great number of examples and problems has been introduced so that teachers may lay stress on any phase of the work that requires emphasis. How many of these examples and problems are to be worked by the class, the teacher herself may decide, according to the needs of the pupils.

PLAN OF WORK

THE work of the second half of the fifth year is divided into quarters, and presents an orderly arrangement of the arithmetic topics of this term for the guidance of the teacher.

Numerous examples, both oral and written, in all the fundamental processes, are given in response to the repeated demands for accuracy and rapidity in this work. Addition is tested by a slight modification of the civil service method, and frequent tests in approximating answers give other means of checking results. Short methods in multiplication, in division, and in fractions and decimals, are presented in steps of graded difficulty. The teacher is advised to urge the pupils to apply the principles of testing, of approximating, and of short methods in all possible cases, and not to limit their use to the designated examples under these headings.

Daily drills in fundamentals are strongly recommended. The teacher will use judgment in adapting to the needs of the class the amount and character of the review, for it is not expected that each class will complete all the review work of the book during the term.

Decimal fractions, emphasized in the fifth grade and treated fully in this book, are introduced by a simple comparison with the units of United States currency. Common fractions are completely reviewed in each quarter, and their basic principles are applied to the processes with decimals in such a way as to establish clearly and firmly the relations between common and decimal fractions.

The problems are grouped under type forms, and are adapted to the experience and interests of the children.

CONTENTS

FIRST QUARTER

PAGE
Counting 11
Addition 11
Subtraction 15
Multiplication 16
Division 17
Approximate Answers 18
Short Methods; Multiplying by 50 20
Reduction of Fractions 21
Least Common Multiple 21
Addition and Subtraction of Fractions 22
Multiplication of Fractions 24
Dividing a Fraction by an Integer 24
Dividing a Mixed Number by an Integer 26
Dividing an Integer by a Fraction or a Mixed Number . 27
Dividing a Fraction by a Fraction or a Mixed Number . 29
Uses of Cancellation 30
Parts of Numbers 31
Reading and Writing Decimal Fractions 33
Reducing Common Fractions to Decimal Fractions . . . 36
Mixed Decimals 37
Reducing Decimal Fractions to Common Fractions . . . 39
Denominate Units 40
Bills 41

SECOND QUARTER

Counting 46
Roman Notation 46
Addition 46
Subtraction 50
Multiplication 51
Division 52
Approximate Answers 53

PAGE
Short Methods; Multiplying by 25 54
Helps in Factoring 54
Addition and Subtraction of Fractions 55
Multiplication and Division of Fractions 56
Reducing a Complex Fraction to a Common Fraction . . 57
Reading and Writing Decimals 60
Reduction of Decimals 63
Addition of Decimals 63
Important Principles of Common and Decimal Fractions . 65
Subtraction of Decimals 67
Multiplying a Decimal by an Integer 69
Multiplying an Integer by a Decimal 71
Denominate Units; Fractional Parts of a Dollar . . . 73
Bills 76

THIRD QUARTER

Counting 81
Roman Notation 81
Addition 81
Subtraction 85
Multiplication 86
Division 87
Approximate Answers 88
Short Methods; Multiplying by 12½ 89
Parentheses 90
Addition and Subtraction of Fractions 90
Multiplication and Division of Fractions 91
Parts of Numbers 92
Reading and Writing Decimals 96
Addition and Subtraction of Decimals 97
Multiplication of Decimals 98
Multiplying a Decimal by a Decimal 98
Reduction of Decimals 100
Dividing a Decimal by an Integer 101
Dividing a Decimal by 10, 20, 30, etc. 104
Dividing a Decimal by 100, 200, 300, etc. 106
Denominate Units 109
Fractional Parts of a Dollar 110
Bills 110

FOURTH QUARTER

PAGE
Counting 114
Addition 114
Subtraction 117
Multiplication 118
Division 119
Approximate Answers 120
Addition and Subtraction of Fractions 121
Multiplication and Division of Fractions 122
Parts of Numbers 123
Reading and Writing Decimals 125
Reduction of Decimals 126
Addition and Subtraction of Decimals 127
Multiplication of Decimals 130
Dividing a Decimal by an Integer 130
Dividing an Integer by a Decimal 131
Dividing a Decimal by a Decimal 131
Fractional Parts of a Dollar 134
Denominate Units 136
Bills 137

Complete Multiplication Table 142
Tables of Measures 143

FIFTH YEAR: SECOND HALF

FIRST QUARTER

COUNTING

1. Oral Exercises.

1. Beginning with 8, count by 5's to 83.
2. Beginning with 4, count by 6's to 82.
3. Beginning with 2, count by 7's to 86.
4. Beginning with 3, count by 8's to 91.

ADDITION

2. Oral Exercises.

At sight, give the sums of the following numbers:

1. 35 28	**5.** 65 29	**9.** 47 18	**13.** 75 26	**17.** 37 29
2. 56 38	**6.** 38 29	**10.** 98 38	**14.** 64 28	**18.** 56 37
3. 65 27	**7.** 56 29	**11.** 74 19	**15.** 66 26	**19.** 54 37
4. 63 28	**8.** 52 19	**12.** 55 25	**16.** 32 18	**20.** 57 38

3. Written Exercises.

To test addition, add the sums of the different columns:

8,347	Sum of units' column	32
286	Sum of tens' column	23
9,717	Sum of hundreds' column	20
43	Sum of thousands' column	17
869		19,262
19,262		

Add and test, timing yourself on each example:

1.	2.	3.
6,947	5,079	7,943
5,876	9,584	5,896
3,895	6,893	8,659
7,589	8,748	7,484
9,432	7,695	4,598
4,378	4,957	6,487
6,954	9,684	9,954
9,873	3,879	6,489
5,685	5,278	5,763
4,958	6,395	9,849

4.	5.	6.
8,398	9,765	5,978
7,654	4,837	8,646
9,587	5,988	6,897
4,996	6,795	9,586
3,879	4,976	5,998
5,758	9,538	4,879
9,487	6,997	9,457
8,594	5,889	3,943
7,945	6,798	5,879
5,897	4,987	6,587

7. 8,597
9,784
4,967
3,895
8,769
5,488
3,594
9,876
5,983
7,539

8. 9,486
7,569
9,854
7,593
4,968
3,799
5,387
6,858
8,743
9,988

9. 5,938
4,867
7,659
4,876
5,968
9,599
4,735
5,897
6,538
9,796

10. $ 89.57
7.65
394.89
78.94
563.76
59.49
963.84
38.19
9.58
587.64

11. $ 3,687.95
596.87
28,975.68
9,864.93
78.57
5,965.79
450.65
9.17
908.09
54.93

12. $ 9.87
6,453.95
967.08
94.86
9,585.79
697.54
4,985.67
592.88
9.59
6,476.95

13. $ 697.08
5,988.95
347.87
95.69
769.56
86.95
9,858.19
594.68
27.94
869.57

14. $ 5,090.17
689.58
4,974.96
857.85
96.68
9,678.57
28,597.29
19,468.50
697.84
8,462.97

15. $32,684.76
9,873.98
14,968.57
8,597.65
959.49
5,746.98
887.74
95.59
764.87
79.68

16. Add:

Eighty-six million seven hundred forty-nine thousand nine hundred ninety-eight,

Fifty-seven million nine hundred sixty-seven thousand eight hundred fifty-nine,

Seventy-nine million eight hundred ninety-five thousand seven hundred eighty-seven,

Ninety-eight million six hundred fifty-eight thousand six hundred thirty-four,

Fourteen million seven hundred eighty-six thousand five hundred seventy-six,

Thirty-five million five hundred seventy-nine thousand nine hundred seventeen,

Sixty-nine million seven hundred eighteen thousand eight hundred thirteen.

17. Add:

Eight dollars and seventy-five cents,

Nine thousand seven hundred fifty-six dollars and eighty-nine cents,

Eight hundred seventy dollars and seven cents,

Ninety dollars and fifty cents,

Eight thousand nine hundred eighty-seven dollars and sixty-eight cents,

Five hundred dollars and eighty cents,

Thirty-nine dollars and ninety-six cents.

18. Add:

Nineteen dollars and twenty-two cents,

Three thousand eighteen dollars and nineteen cents,

Seven hundred fifty-six dollars and eight cents,

Ninety-eight dollars and five cents.

Six thousand four hundred eighty-six dollars,

Twenty-seven dollars and eighty-six cents.

SUBTRACTION

4. Oral Exercises.

Find the amount of change in each of the following:

	Amount of Purchase	Amount Given to Storekeeper	Change		Amount of Purchase	Amount Given to Storekeeper	Change
1.	$ .74	$ 1.00		14.	$1.29	$ 1.50	
2.	.67	.75		15.	1.37	2.00	
3.	.19	.25		16.	.42	1.00	
4.	.56	2.00		17.	.37	.50	
5.	.95	5.00		18.	6.60	10.00	
6.	2.75	5.00		19.	1.54	2.00	
7.	.18	.50		20.	.66	1.00	
8.	1.43	2.00		21.	3.55	5.00	
9.	3.98	10.00		22.	.08	.25	
10.	.37	1.00		23.	1.18	1.50	
11.	2.98	5.00		24.	.58	.75	
12.	.53	1.00		25.	.19	1.00	
13.	.09	2.00		26.	4.87	5.00	

5. Written Exercises.

1. 6,304,503
− 5,708,637

2. 3,986,237
− 1,978,473

3. 5,804,756
− 2,694,838

4. 5,104,763
− 2,967,858

5. 2,680,400
− 1,397,682

6. 9,407,632
− 2,742,963

7. 8,473,960
− 2,586,878

8. 5,320,631
− 2,938,597

9. 7,603,900
− 2,895,208

10. 5,938,695
− 2,588,948

11. 7,392,608
− 3,957,749

12. 9,300,593
− 6,708,789

13. $\begin{array}{r}\$95{,}362.07\\ -\ 19{,}849.59\\ \hline\end{array}$

14. $\begin{array}{r}\$20{,}437.13\\ -\ 18{,}698.75\\ \hline\end{array}$

15. $\begin{array}{r}\$32{,}954.05\\ -\ 19{,}876.37\\ \hline\end{array}$

16. $\begin{array}{r}\$76{,}003.11\\ -\ 25{,}876.45\\ \hline\end{array}$

17. $\begin{array}{r}\$65{,}132.74\\ -\ 19{,}762.89\\ \hline\end{array}$

18. $\begin{array}{r}\$81{,}934.52\\ -\ 27{,}979.54\\ \hline\end{array}$

19. Mt. Everest, in Asia, the highest mountain peak in the world, is 29,002 feet high.

The highest peak in North America is Mt. McKinley, in Alaska, which is 20,464 feet high.

Mt. Whitney, in California, is the highest peak in the United States. It is 14,502 feet high.

(*a*) How much higher is Mt. Everest than Mt. McKinley?

(*b*) Mt. Everest is how much higher than Mt. Whitney?

(*c*) What is the difference in height between Mt. Whitney and Mt. McKinley?

MULTIPLICATION

6. Oral Exercises.

Give answers at sight:

1. $\begin{array}{r}108\\ \times\ \ 8\\ \hline\end{array}$

2. $\begin{array}{r}81\\ \times\ 9\\ \hline\end{array}$

3. $\begin{array}{r}28\\ \times\ 20\\ \hline\end{array}$

4. $\begin{array}{r}25\\ \times\ 40\\ \hline\end{array}$

5. $\begin{array}{r}25\\ \times\ 20\\ \hline\end{array}$

6. $\begin{array}{r}51\\ \times\ 6\\ \hline\end{array}$

7. $\begin{array}{r}52\\ \times\ 30\\ \hline\end{array}$

8. $\begin{array}{r}50\\ \times\ 80\\ \hline\end{array}$

9. $\begin{array}{r}125\\ \times\ \ 4\\ \hline\end{array}$

10. $\begin{array}{r}71\\ \times\ 8\\ \hline\end{array}$

11. $\begin{array}{r}75\\ \times\ 20\\ \hline\end{array}$

12. $\begin{array}{r}16\\ \times\ 60\\ \hline\end{array}$

13. $\begin{array}{r}24\\ \times\ 20\\ \hline\end{array}$

14. $\begin{array}{r}91\\ \times\ 7\\ \hline\end{array}$

15. $\begin{array}{r}33\\ \times\ 30\\ \hline\end{array}$

16. $\begin{array}{r}23\\ \times\ 30\\ \hline\end{array}$

17. $\begin{array}{r}15\\ \times\ 30\\ \hline\end{array}$

18. $\begin{array}{r}61\\ \times\ 5\\ \hline\end{array}$

19. $\begin{array}{r}12\\ \times\ 40\\ \hline\end{array}$

20. $\begin{array}{r}909\\ \times\ \ 9\\ \hline\end{array}$

7. Written Exercises.

1. 487,954 × 67
2. 759,487 × 95
3. 658,976 × 84
4. 539,687 × 65
5. 365,795 × 79
6. 476,869 × 58
7. 847,598 × 309
8. 690,875 × 708
9. 560,789 × 605
10. 758,069 × 36
11. 874,906 × 58
12. 493,568 × 74
13. $9,758.24 × 58
14. $5,937.85 × 39
15. $4,986.75 × 87
16. $3,789.68 × 79
17. $6,845.97 × 76
18. $8,698.76 × 95

DIVISION

8. Oral Exercises.

Divide at sight:

1. 9)819
2. 5)605
3. 9)189
4. 12)1,440
5. 8)872
6. 12)1,320
7. 7)637
8. 9)1,881
9. 6)540
10. 9)1,080
11. 8)848
12. 12)1,080
13. 7)847
14. 8)648
15. 7)749
16. 4)1,000
17. 4)328
18. 5)560
19. 3)750
20. 7)756

9. Written Exercises.

1. $87\overline{)646{,}835}$
2. $39\overline{)793{,}074}$
3. $73\overline{)163{,}492}$
4. $56\overline{)537{,}482}$
5. $64\overline{)390{,}831}$
6. $95\overline{)182{,}980}$
7. $28\overline{)148{,}630}$
8. $90\overline{)465{,}873}$
9. $60\overline{)254{,}852}$
10. $607\overline{)252{,}346}$
11. $709\overline{)132{,}687}$
12. $805\overline{)620{,}894}$
13. $378\overline{)167{,}832}$
14. $269\overline{)578{,}065}$
15. $195\overline{)684{,}321}$

10. Oral Exercises.

1. Find $\frac{3}{8}$ of
2. Find $\frac{5}{8}$ of
3. Find $\frac{7}{8}$ of

56
8
64
72
16
96
32
40
24
48
80

4. Find $\frac{1}{6}$ of
5. Find $\frac{5}{6}$ of

72
42
36
54
60
1
18
48
30
24
12

APPROXIMATE ANSWERS

11. Exercises.

It is sometimes convenient to be able to give at sight answers that are nearly exact. It saves time and effort when an exact answer is not necessary, and it serves as a check against mistakes in figuring.

1. What is the sum of \$2.96, \$3.48, and \$5.03?

\$2.96 is a little less than \$3.
\$3.48 is a little less than \$3.50.
\$5.03 is a little more than \$5.

The sum of \$3, \$3.50, and \$5 is \$11.50, which is a nearly exact answer to the question.

2. I had \$37.05 in the bank. I drew out \$19.97 to pay a bill. How much did I then have in the bank?

\$37.05 is a little more than \$37.
\$19.97 is a little less than \$20.
\$37 − \$20 = \$17. I had about \$17 left in the bank.

3. How much will 39 tons of coal cost at \$6.10 a ton?

39 tons is a little less than 40 tons.
\$6.10 is a little more than \$6.
40 tons, at \$6 a ton, would cost \$240, which is a nearly exact answer.

4. Divide \$1,025 into 26 equal parts.

\$1,025 is a little more than \$1,000.
26 is a little more than 25.
\$1,000 ÷ 25 = \$40, which is a nearly exact answer.

Answers obtained in this way are called *approximate answers.*

5. Find the exact answers in Exs. 1–4 and see how closely they compare with the approximate answers.

Look at each of the following examples and see how near you can come to finding the correct answer at sight. Test your answer, using pencil and paper.

6. How much will 49 Readers cost at \$.40 each?

7. Of the 498 school children at a ball game, 204 were girls. How many were boys?

8. Mr. Lewis paid $19.75 for a suit, $4.50 for shoes, and $41 for an overcoat. How much did he pay for all three?

9. Find the cost of 3 gal. 3 qt. at $1.30 a gallon.

3 gal. 3 qt. is about how many gallons?

10. At an average rate of 49 miles an hour, how far will a train go in 9$\frac{6}{7}$ hours?

11. An automobile travels at the rate of 29 miles an hour. At that rate, how many hours would it take to travel 238 miles?

12. At 26¢ a dozen, what would a grocer pay for 19 doz. eggs?

13. Mr. Hopkins's farm contains 91 acres. What is it worth at the rate of $49 an acre?

SHORT METHODS; MULTIPLYING BY 50

12. Written Exercises.

What is the shortest way of multiplying a number by 100?

Since 50 is $\frac{1}{2}$ of 100, to multiply by 50 we annex two naughts and divide by 2.

Multiply 62 by 50.

$62 \times 50 = 6{,}200 \div 2 = 3{,}100.$ *Ans.*

Write answers:

1. 48 × 50
2. 44 × 50
3. 86 × 50
4. 68 × 50
5. 82 × 50
6. 24 × 50
7. 28 × 50
8. 42 × 50
9. 66 × 50
10. 84 × 50
11. 34 × 50
12. 52 × 50
13. 38 × 50
14. 56 × 50
15. 36 × 50
16. 72 × 50
17. 96 × 50
18. 74 × 50
19. 58 × 50
20. 94 × 50

REDUCTION OF FRACTIONS

13. Oral Exercises.

At sight, reduce to lowest terms:

1. $\frac{84}{144}$

2. $\frac{36}{72}$

3. $\frac{55}{132}$

4. $\frac{36}{81}$

5. $\frac{12}{60}$

6. $\frac{18}{54}$

7. $\frac{42}{63}$

8. $\frac{64}{96}$

9. $\frac{56}{64}$

10. $\frac{40}{75}$

11. $\frac{49}{84}$

12. $\frac{24}{64}$

13. $\frac{25}{75}$

14. $\frac{35}{56}$

15. $\frac{63}{108}$

At sight, reduce to whole or mixed numbers:

16. $\frac{78}{12}$

17. $\frac{18}{5}$

18. $\frac{108}{9}$

19. $\frac{80}{3}$

20. $\frac{54}{4}$

21. $\frac{35}{6}$

22. $\frac{90}{8}$

23. $\frac{29}{2}$

24. $\frac{52}{7}$

25. $\frac{83}{10}$

26. $\frac{132}{11}$

27. $\frac{83}{4}$

28. $\frac{95}{5}$

29. $\frac{72}{9}$

30. $\frac{23}{2}$

31. $\frac{32}{3}$

32. $\frac{56}{8}$

33. $\frac{85}{12}$

34. $\frac{85}{7}$

35. $\frac{75}{6}$

LEAST COMMON MULTIPLE

14. Written Exercises.

Find the least common multiple of 15, 20, 30, and 40.

$$\begin{array}{r} 2\underline{)\cancel{15},\ \cancel{20},\ 30,\ 40} \\ 5\underline{)\ 15,\ 20} \\ 3,\ \ 4 \end{array}$$

We cross off 15 because it is a factor of 30. Why do we cross off 20?

$2 \times 5 \times 3 \times 4 = 120$ l. c. m.

Find the least common multiple:

1. 12, 15, 20

2. 8, 12, 20, 24

3. 6, 15, 21, 18

4. 3, 15, 20, 24

5. 8, 15, 60, 40

6. 16, 20, 40, 48

7. 15, 24, 30, 36

8. 12, 15, 18, 21, 30

9. 24, 28, 42, 60

10. 12, 27, 36, 45

We cannot add or subtract fractions, unless they have the same denominator. When the fractions do not have the same denominator, we *find the least common multiple of the denominators and change each fraction to a fraction whose denominator is the l.c.m. of the given denominators.*

ADDITION AND SUBTRACTION OF FRACTIONS

15. Oral Exercises.

Give answers at sight:

1. $\frac{1}{2}+\frac{3}{4}$
2. $\frac{2}{9}+\frac{2}{3}$
3. $\frac{2}{5}+\frac{3}{10}$
4. $\frac{5}{8}+\frac{1}{12}$
5. $\frac{5}{6}+\frac{2}{3}$
6. $\frac{5}{16}+\frac{3}{4}$
7. $\frac{1}{2}+\frac{1}{4}+\frac{3}{8}$
8. $\frac{3}{5}+\frac{7}{10}+\frac{1}{2}$
9. $\frac{7}{12}+\frac{5}{6}+\frac{1}{3}$
10. $\frac{2}{5}+\frac{3}{10}+\frac{7}{20}$

16. Written Exercises.

1. $\frac{7}{12}+\frac{4}{15}+\frac{3}{5}+\frac{2}{3}$
2. $\frac{1}{2}+\frac{5}{12}+\frac{7}{9}+\frac{5}{6}$
3. $\frac{2}{5}\times\frac{1}{2}+\frac{7}{15}+\frac{11}{20}$
4. $\frac{1}{4}+\frac{7}{12}+\frac{5}{8}+\frac{3}{10}$
5. $\frac{11}{24}+\frac{2}{3}+\frac{7}{8}+\frac{5}{6}$
6. $\frac{3}{4}+\frac{11}{25}+\frac{3}{5}+\frac{1}{2}$
7. $\frac{1}{12}+\frac{3}{10}+\frac{2}{5}+\frac{7}{8}$
8. $\frac{4}{7}+\frac{1}{2}+\frac{2}{3}+\frac{3}{5}$
9. $\frac{3}{8}+\frac{3}{4}+\frac{2}{7}+\frac{1}{2}$
10. $\frac{1}{3}+\frac{5}{6}+\frac{11}{12}+\frac{9}{10}$
11. $19\frac{2}{3}+7\frac{5}{8}+26\frac{7}{12}$
12. $27\frac{3}{5}+8\frac{5}{12}+\frac{5}{6}$
13. $54\frac{7}{9}+32\frac{1}{3}+49\frac{11}{27}$
14. $9\frac{7}{30}+62\frac{11}{40}+36\frac{9}{24}$
15. $87\frac{3}{5}+38\frac{7}{8}+39\frac{11}{15}$
16. $29\frac{4}{51}+37\frac{5}{17}+\frac{2}{3}$
17. $30\frac{8}{14}+86\frac{5}{21}+14\frac{5}{7}$
18. $18\frac{3}{5}+59\frac{7}{12}+46\frac{17}{40}$
19. $47\frac{7}{8}+16\frac{4}{7}+58\frac{3}{4}$
20. $76\frac{7}{10}+17\frac{17}{20}+68\frac{9}{25}$
21. $\begin{array}{r}29\frac{1}{2}\\51\frac{1}{4}\\9\frac{2}{3}\\\hline\end{array}$
22. $\begin{array}{r}70\frac{3}{4}\\19\frac{1}{2}\\31\frac{1}{5}\\\hline\end{array}$
23. $\begin{array}{r}497\frac{1}{8}\\308\frac{5}{6}\\710\frac{3}{4}\\\hline\end{array}$
24. $\begin{array}{r}799\frac{1}{5}\\805\frac{3}{10}\\194\frac{2}{3}\\\hline\end{array}$
25. $\begin{array}{r}289\frac{5}{8}\\517\frac{1}{6}\\605\frac{5}{12}\\\hline\end{array}$

26.	**27.**	**28.**	**29.**	**30.**
$309\frac{3}{8}$	$86\frac{2}{5}$	$256\frac{1}{8}$	$852\frac{1}{5}$	$615\frac{1}{7}$
$62\frac{1}{2}$	$109\frac{1}{4}$	$372\frac{5}{8}$	$671\frac{1}{3}$	$256\frac{8}{21}$
$503\frac{1}{3}$	$67\frac{3}{8}$	$650\frac{2}{3}$	$258\frac{3}{4}$	$210\frac{1}{14}$

17. Oral Exercises.

1. $\frac{3}{4} - \frac{1}{2}$
2. $\frac{5}{8} - \frac{1}{4}$
3. $\frac{3}{5} - \frac{1}{10}$
4. $\frac{5}{6} - \frac{2}{3}$
5. $\frac{7}{8} - \frac{3}{4}$
6. $\frac{5}{16} - \frac{1}{4}$
7. $10 - \frac{2}{5}$
8. $15 - \frac{2}{3}$
9. $25 - \frac{3}{7}$
10. $17 - \frac{4}{9}$
11. $20 - \frac{3}{8}$
12. $8 - \frac{7}{16}$

18. Written Exercises.

1.	**3.**	**5.**	**7.**	**9.**
$91\frac{1}{3}$	$88\frac{1}{2}$	$31\frac{3}{5}$	$215\frac{1}{3}$	$252\frac{1}{8}$
$-\ 29\frac{2}{5}$	$-\ 59\frac{3}{4}$	$-\ 19\frac{5}{7}$	$-\ 66\frac{3}{4}$	$-\ 67\frac{5}{6}$

2.	**4.**	**6.**	**8.**	**10.**
$50\frac{1}{6}$	$72\frac{1}{3}$	32	$619\frac{2}{5}$	$76\frac{1}{12}$
$-\ 18\frac{1}{2}$	$-\ 39\frac{1}{2}$	$-\ 30\frac{7}{8}$	$-\ 419\frac{2}{3}$	$-\ 46\frac{1}{8}$

11. $\frac{15}{24} - \frac{7}{16}$
12. $\frac{11}{21} - \frac{9}{35}$
13. $\frac{7}{12} - \frac{11}{20}$
14. $\frac{9}{40} - \frac{1}{60}$
15. $\frac{17}{45} - \frac{3}{10}$
16. $\frac{5}{18} - \frac{1}{12}$
17. $\frac{7}{32} - \frac{7}{40}$
18. $\frac{5}{8} - \frac{1}{3}$
19. $\frac{4}{5} - \frac{7}{12}$
20. $\frac{3}{4} - \frac{4}{7}$
21. $\frac{7}{8} - \frac{5}{6}$
22. $\frac{7}{10} - \frac{7}{15}$
23. $19\frac{1}{3} - 8\frac{3}{4}$
24. $22\frac{2}{7} - 13\frac{2}{5}$
25. $50\frac{5}{12} - 37\frac{5}{6}$
26. $38\frac{1}{4} - 19\frac{1}{2}$
27. $108\frac{5}{6} - 39\frac{11}{15}$
28. $30\frac{7}{9} - 16\frac{3}{4}$
29. $42\frac{1}{3} - 18\frac{4}{15}$
30. $57\frac{1}{7} - 29\frac{3}{4}$
31. $116\frac{7}{24} - 38\frac{2}{3}$
32. $230\frac{4}{15} - 67\frac{19}{60}$

MULTIPLICATION OF FRACTIONS

19. Written Exercises.

1. $\frac{2}{3} \times \frac{9}{16}$
2. $1\frac{3}{4} \times 5\frac{1}{3}$
3. $2\frac{1}{4} \times 5\frac{1}{2} \times \frac{8}{11}$
4. $5\frac{4}{7} \times 4\frac{1}{5} \times 7\frac{6}{7}$
5. $\frac{8}{11} \times 8\frac{1}{4} \times \frac{1}{6}$
6. $14\frac{2}{3} \times \frac{9}{11} \times 6\frac{5}{8}$
7. $21\frac{7}{8} \times 7\frac{1}{5} \times \frac{2}{15}$
8. $\frac{7}{65} \times 3\frac{3}{4} \times 1\frac{6}{7}$
9. $18\frac{3}{4} \times 2\frac{2}{9} \times \frac{2}{7}$
10. $3\frac{1}{5} \times \frac{15}{32} \times \frac{2}{3}$

11. $\begin{array}{r} 36 \\ \times\ \ 9\frac{7}{8} \\ \hline \end{array}$ **13.** $\begin{array}{r} 25 \\ \times\ 38\frac{5}{9} \\ \hline \end{array}$ **15.** $\begin{array}{r} 89\frac{3}{4} \\ \times\ 29 \\ \hline \end{array}$ **17.** $\begin{array}{r} 65 \\ \times\ 12\frac{4}{5} \\ \hline \end{array}$ **19.** $\begin{array}{r} 51 \\ \times\ 12\frac{3}{5} \\ \hline \end{array}$

12. $\begin{array}{r} 75 \\ \times\ 19\frac{3}{4} \\ \hline \end{array}$ **14.** $\begin{array}{r} 49 \\ \times\ 49\frac{3}{4} \\ \hline \end{array}$ **16.** $\begin{array}{r} 28 \\ \times\ \ 8\frac{3}{4} \\ \hline \end{array}$ **18.** $\begin{array}{r} 39 \\ \times\ 10\frac{2}{3} \\ \hline \end{array}$ **20.** $\begin{array}{r} 60\frac{3}{4} \\ \times\ 15 \\ \hline \end{array}$

DIVIDING A FRACTION BY AN INTEGER

20. Written Exercises.

I. $2\overline{)8\text{ hats}}$ $2\overline{)8\text{ dollars}}$ $2\overline{)8\text{ ninths}}$
4 hats 4 dollars 4 ninths

We may express the last example as follows:

$$\frac{8}{9} \div 2 = \frac{4}{9}.$$

Dividing the numerator of a fraction by any number divides the fraction by that number.

Write answers to the following:

1. $\frac{4}{5} \div 2$
2. $\frac{3}{5} \div 3$
3. $\frac{2}{7} \div 2$
4. $\frac{8}{9} \div 4$
5. $\frac{4}{11} \div 2$
6. $\frac{3}{8} \div 3$
7. $\frac{2}{9} \div 2$
8. $\frac{3}{4} \div 3$
9. $\frac{8}{11} \div 2$
10. $\frac{9}{11} \div 3$
11. $\frac{4}{7} \div 2$
12. $\frac{4}{11} \div 4$
13. $\frac{8}{15} \div 4$
14. $\frac{6}{11} \div 2$
15. $\frac{10}{11} \div 5$

16. If $\frac{3}{8}$ of a pie is cut into 3 equal pieces, what fraction of the pie will each part be?

17. If $\frac{7}{8}$ of a box of marbles is equally divided among 7 boys, how much will each boy receive?

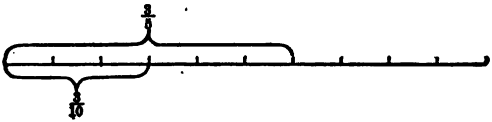
18. If $\frac{4}{5}$ of a dollar is divided equally between 2 girls, what part of a dollar does each receive?

19. If $\frac{4}{7}$ of a bushel of oats is divided equally between 4 horses, what part of a bushel does each receive?

20. If $\frac{9}{10}$ of the expenses of a baseball nine is shared equally by each member of the nine, what part of the expense is paid by each member?

II. Divide $\frac{3}{5}$ by 2.

3 cannot be evenly divided by 2. We must then try another method.



Dividing a number by 2 is the same as taking $\frac{1}{2}$ of it.

$\frac{1}{2}$ of $\frac{3}{5} = \frac{3}{10}$. $\frac{3}{5} \div 2 = \frac{3}{10}$.

21. Divide a line into quarters and from your diagram answer the following:

$\frac{1}{4} \div 2 = ?$ $\frac{1}{2}$ of $\frac{1}{4} = ?$
$\frac{3}{4} \div 2 = ?$ $\frac{1}{2}$ of $\frac{3}{4} = ?$

Multiplying the denominator of a fraction by any number divides the fraction by that number.

Write answers to the following:

22. $\frac{2}{5} \div 3$ **24.** $\frac{4}{5} \div 3$ **26.** $\frac{4}{5} \div 5$
23. $\frac{3}{8} \div 4$ **25.** $\frac{3}{7} \div 2$ **27.** $\frac{1}{7} \div 2$

28. $\frac{2}{7} \div 4$
29. $\frac{2}{5} \div 4$
30. $\frac{2}{9} \div 5$
31. $\frac{1}{5} \div 4$
32. $\frac{7}{8} \div 2$
33. $\frac{3}{10} \div 4$
34. $\frac{7}{8} \div 5$
35. $\frac{2}{3} \div 4$
36. $\frac{3}{5} \div 5$

To divide a fraction by an integer, either *divide the numerator by the divisor or multiply the denominator by the divisor.*

DIVIDING A MIXED NUMBER BY AN INTEGER

21. Written Exercises.

CASE I. If the dividend is a mixed number, reduce it to an improper fraction before dividing. (Except in examples like Case II below.)

Divide $1\frac{3}{4}$ by 5.

$$1\frac{3}{4} \div 5 = \frac{7}{4} \div 5 = \frac{7}{20}. \quad \textit{Ans.}$$

1. $1\frac{2}{5} \div 7$
2. $2\frac{2}{5} \div 4$
3. $1\frac{1}{7} \div 5$
4. $2\frac{3}{5} \div 2$
5. $3\frac{1}{5} \div 3$
6. $6\frac{2}{3} \div 4$
7. $5\frac{1}{5} \div 7$
8. $2\frac{1}{5} \div 6$
9. $4\frac{2}{3} \div 7$
10. $5\frac{1}{3} \div 4$
11. $1\frac{5}{8} \div 3$
12. $2\frac{4}{5} \div 2$
13. $3\frac{2}{7} \div 5$
14. $3\frac{1}{6} \div 4$
15. $1\frac{1}{5} \div 3$
16. $3\frac{4}{5} \div 5$
17. $2\frac{3}{8} \div 4$
18. $3\frac{2}{5} \div 5$
19. $4\frac{2}{7} \div 6$
20. $5\frac{1}{4} \div 7$

CASE II. When both the whole number and the fraction in the dividend can be evenly divided by the divisor, divide each separately by the divisor.

Divide $12\frac{2}{5}$ by 2.

Divide 12 by 2 and $\frac{2}{5}$ by 2.

$$\begin{array}{r} 2\overline{)12\frac{2}{5}} \\ 6\frac{1}{5} \quad \textit{Ans.} \end{array}$$

22. Oral Exercises.

Divide at sight:

1. $6\frac{3}{4} \div 3$
2. $4\frac{2}{3} \div 2$
3. $10\frac{4}{7} \div 2$
4. $10\frac{5}{6} \div 5$
5. $8\frac{4}{5} \div 4$
6. $12\frac{6}{7} \div 3$
7. $9\frac{3}{5} \div 3$
8. $15\frac{5}{7} \div 5$
9. $14\frac{4}{9} \div 2$
10. $16\frac{8}{9} \div 8$
11. $16\frac{4}{7} \div 4$
12. $21\frac{7}{8} \div 7$

CASE III. When the divisor is less than 13, we may frequently shorten the work by using the following method.

Divide $12\frac{3}{5}$ by 8.

$$8\overline{)12\frac{3}{5}}$$
$$1\frac{23}{40} \textit{ Ans.}$$

$12 \div 8 = 1$ and 4 over. Change the 4 to fifths ($\frac{20}{5}$) and add it to the fraction $\frac{3}{5}$, which gives $\frac{23}{5}$.
$\frac{23}{5} \div 8 = \frac{23}{40}$.
The answer is $1\frac{23}{40}$.

23. Written Exercises.

1. $2\overline{)7\frac{3}{5}}$
2. $5\overline{)8\frac{1}{3}}$
3. $7\overline{)12\frac{3}{5}}$
4. $4\overline{)17\frac{2}{5}}$
5. $5\overline{)16\frac{2}{3}}$
6. $11\overline{)13\frac{1}{4}}$
7. $9\overline{)21\frac{3}{5}}$
8. $7\overline{)19\frac{5}{6}}$
9. $7\overline{)15\frac{5}{6}}$
10. $2\overline{)135\frac{3}{5}}$
11. $7\overline{)67\frac{6}{10}}$
12. $9\overline{)110\frac{3}{4}}$

DIVIDING AN INTEGER BY A FRACTION OR A MIXED NUMBER

24. Written Exercises.

1. Divide 3 by $\frac{3}{4}$.

$3 = 3$ times $\frac{4}{4}$, or $\frac{12}{4}$. $\frac{12}{4} \div \frac{3}{4} = 4$.

If we change $\frac{3}{4}$ to $\frac{4}{3}$ (invert it) and multiply 3 by $\frac{4}{3}$, we have

$$\cancel{3} \times \frac{4}{\cancel{3}} = 4.$$

We may work this example as follows: $3 \div \frac{3}{4} = \cancel{3} \times \frac{4}{\cancel{3}} = 4.$ *Ans.*

2. In the same way, divide 2 by $\frac{2}{5}$.

$$2 \div \frac{2}{5} = \cancel{2} \times \frac{5}{\cancel{2}} = 5. \quad \textit{Ans.}$$

To divide an integer by a fraction, *invert the divisor and multiply.* Cancel where possible.

3. $6 \div \frac{2}{5}$
4. $8 \div \frac{4}{7}$
5. $9 \div \frac{3}{5}$
6. $12 \div \frac{4}{7}$
7. $8 \div \frac{2}{3}$
8. $15 \div \frac{3}{5}$
9. $16 \div \frac{4}{5}$
10. $9 \div \frac{3}{4}$
11. $7 \div \frac{7}{9}$
12. $18 \div \frac{3}{5}$
13. $5 \div \frac{2}{5}$
14. $8 \div \frac{3}{7}$
15. $17 \div \frac{2}{3}$
16. $16 \div \frac{3}{4}$
17. $18 \div \frac{4}{5}$
18. $22 \div \frac{4}{7}$
19. $13 \div \frac{3}{8}$
20. $15 \div \frac{2}{7}$
21. $12 \div \frac{5}{6}$
22. $20 \div \frac{3}{4}$

25. Written Exercises.

When the divisor is a mixed number, reduce it to an improper fraction before dividing.

Divide 8 by $1\frac{3}{5}$.

$$1\tfrac{3}{5} = \tfrac{8}{5}.$$

$$8 \div \tfrac{8}{5} = 8 \times \tfrac{5}{8} = 5. \quad \textit{Ans.}$$

1. $4 \div 1\frac{1}{3}$
2. $6 \div 1\frac{1}{2}$
3. $10 \div 1\frac{1}{4}$
4. $16 \div 2\frac{2}{3}$
5. $15 \div 1\frac{2}{3}$
6. $8 \div 1\frac{1}{7}$
7. $9 \div 2\frac{1}{4}$
8. $12 \div 2\frac{2}{5}$
9. $14 \div 1\frac{2}{5}$
10. $19 \div 3\frac{4}{5}$
11. $15 \div 2\frac{2}{3}$
12. $9 \div 3\frac{1}{7}$
13. $16 \div 4\frac{2}{3}$
14. $12 \div 3\frac{3}{4}$
15. $7 \div 2\frac{1}{2}$
16. $14 \div 3\frac{1}{5}$
17. $18 \div 5\frac{1}{3}$
18. $16 \div 4\frac{1}{5}$
19. $30 \div 6\frac{1}{4}$
20. $24 \div 5\frac{1}{4}$

21. How many times could you mark off $\frac{3}{4}$ of an inch on a line 9 in. long?

22. If a boy covers $2\frac{1}{4}$ feet in each stride, how many strides will he take in going 18 feet?

23. At \$$1\frac{1}{4}$ apiece, how many hats could be bought with \$20?

24. How many newspapers can a boy buy with 20¢ at the rate of $\frac{4}{5}$ of a cent each?

25. How many baskets that hold $\frac{5}{8}$ of a bushel each are needed to hold 25 bu. of corn?

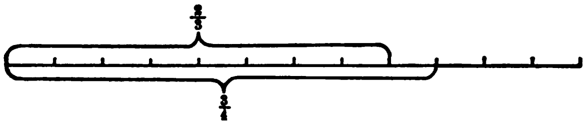
DIVIDING A FRACTION BY A FRACTION OR A MIXED NUMBER

26. Written Exercises.

1. Divide 8 cents by 9 cents.

$$8 \div 9 = \frac{8}{9}.$$

2. Divide $\frac{2}{3}$ by $\frac{3}{4}$.



$$\frac{2}{3} \div \frac{3}{4} = \frac{8}{12} \div \frac{9}{12} = \frac{8}{9}.$$

We get the same result by inverting the divisor, $\frac{3}{4}$, and multiplying.

$$\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}. \quad \textit{Ans.}$$

In dividing a fraction by a fraction, proceed as you did when dividing an integer by a fraction, that is, *invert the divisor and multiply*. Cancel where possible.

If either dividend or divisor is a mixed number, reduce it to an improper fraction before multiplying.

3. Divide $1\frac{3}{5}$ by $3\frac{3}{7}$.

$$1\tfrac{3}{5} \div 3\tfrac{3}{7} = \frac{8}{5} \div \frac{24}{7} = \frac{\overset{1}{\cancel{8}}}{5} \times \frac{7}{\underset{3}{\cancel{24}}} = \frac{7}{15}. \quad \textit{Ans.}$$

4. $\frac{2}{3} \div \frac{4}{5}$

5. $\frac{3}{4} \div \frac{6}{5}$

6. $\frac{2}{5} \div \frac{3}{7}$

7. $\frac{1}{8} \div \frac{5}{6}$

8. $\frac{5}{12} \div \frac{4}{9}$

9. $\frac{7}{9} \div \frac{5}{12}$

10. $\frac{5}{8} \div \frac{11}{24}$

11. $\frac{7}{9} \div \frac{11}{18}$

12. $\frac{3}{4} \div \frac{9}{16}$

13. $\frac{2}{5} \div \frac{2}{3}$

14. $\frac{11}{14} \div \frac{2}{7}$

15. $\frac{11}{15} \div \frac{7}{10}$

16. $1\frac{3}{5} \div \frac{4}{7}$

17. $2\frac{2}{3} \div 1\frac{1}{9}$

18. $1\frac{2}{5} \div \frac{3}{10}$

19. $3\frac{1}{5} \div \frac{4}{5}$

20. $7\frac{1}{3} \div \frac{2}{9}$

21. $3\frac{3}{4} \div 1\frac{1}{8}$

22. $6\frac{1}{4} \div \frac{5}{9}$

23. $3\frac{1}{3} \div \frac{5}{9}$

24. $6\frac{2}{3} \div \frac{5}{7}$

25. $7\frac{2}{3} \div 2\frac{1}{4}$

26. $8\frac{1}{4} \div 1\frac{3}{8}$

27. $26\frac{1}{4} \div 2\frac{1}{3}$

USES OF CANCELLATION

27. Written Problems.

1. How much will 9 barrels of flour cost if 6 barrels cost $32?

Before working this example, ask yourself, "Should the answer be greater or less than the number of dollars given in the problem?" After you have worked the problem, see if your written answer agrees with your answer to this question.

$$\frac{\overset{16}{\cancel{32}} \times \overset{3}{\cancel{9}}}{\underset{\cancel{3}}{\cancel{6}}} = 48. \quad \textit{Ans.}$$

Before working Exs. 2–10, ask yourself, "Should the answer be greater or less than the number of dollars (or the number of miles or the number of cents) given in the problem?" Compare your answer to this question with your written answer.

2. If 6 tons of coal cost $32, what will 15 tons cost?

3. If 6 yd. of ribbon cost 33¢, what will 16 yd. cost?

4. A train travels 630 miles in 12 hours. How far will it travel in 16 hours?

5. Henry bought 60 papers for 80¢. How much would 90 papers cost at the same rate?

6. If 8 lb. of sugar cost 60¢, what will 6 lb. cost?

7. How many *Saturday Evening Posts* at 5¢ each should be exchanged for 60 *Suns* at 2¢ each?

8. Our school nine has more baseballs than it needs, and not enough bats. How many bats worth 30¢ each should we get in exchange for 12 baseballs, if the balls are worth 25¢ each?

9. Two grocers wish to exchange eggs and butter. How many pounds of butter at 30¢ a pound would pay for 24 doz. eggs at 25¢ a dozen?

10. The small boys are going to pull against the big boys at a tug-of-war, and the weight of one group of boys must equal the weight of the other group. How many small boys averaging 64 lb. each should pull against 8 big boys averaging 96 lb. each?

11. A mat is $1\frac{5}{6}$ yd. long and $\frac{3}{4}$ yd. wide. How many square yards are there in it?

12. How many square feet are there in the mat in Ex. 11?

PARTS OF NUMBERS

28. Oral Exercises.

Find:

1. $\frac{1}{7}$ of 21, 35, 63, 84.
2. $\frac{1}{8}$ of 32, 64, 96, 48.
3. $\frac{1}{6}$ of 30, 66, 24, 36.
4. $\frac{1}{9}$ of 27, 45, 108, 81.
5. $\frac{2}{7}$ of 28, 56, 42, 49.
6. $\frac{4}{7}$ of 28, 56, 42, 49.
7. $\frac{3}{8}$ of 24, 16, 40, 56.
8. $\frac{7}{8}$ of 32, 64, 24, 48.
9. $\frac{5}{9}$ of 72, 54, 27, 63.
10. $\frac{7}{9}$ of 18, 45, 81, 108.
11. $\frac{5}{6}$ of 36, 48, 24, 72.
12. $\frac{3}{5}$ of 30, 45, 25, 60.

29. Written Exercises.

Find:

1. $\frac{2}{7}$ of 357. Of 196. Of 385. Of 4,144.

2. $\frac{3}{8}$ of 256 yd. Of 416 lb. Of 272 qt. Of 448 wk.

3. $\frac{5}{6}$ of $216. Of $450. Of $282. Of $336.

4. $\frac{4}{9}$ of $3.69. Of $4.41. Of $2.79. Of $37.80.

5. TYPE PROBLEM. There are 1,246 pupils in our school. $\frac{4}{7}$ of the total number are girls. How many girls are there in the school?

$$\frac{4}{\cancel{7}} \times \overset{178}{\cancel{1246}} = 712 \text{ (girls)}. \quad \textit{Ans.}$$

6. How many feet are there in $\frac{7}{8}$ of a mile?

7. James had $4.59. John had $\frac{2}{9}$ as much. How much money did the two boys have together?

8. In a school of 2,170 children, $\frac{3}{7}$ are boys. How many boys are there? How many girls?

9. In a class in which 48 pupils are registered, $\frac{19}{24}$ of the class are present. How many are present?

10. In a farm of 216 acres, $\frac{5}{6}$ is planted with wheat and $\frac{1}{9}$ with corn. How many acres of wheat are there? How many acres of corn? How many acres are left for other purposes?

11. John had $3.24. He spent $\frac{4}{9}$ of his money. How much money did he have left?

12. Gertrude's father bought a stationery business for $624. He sold it for $\frac{7}{8}$ of that amount. How much did he receive from the sale?

30. Written Problems.

1. In a journey, a man traveled $16\frac{3}{7}$ miles the first day, $21\frac{11}{14}$ miles the second day, and $22\frac{4}{21}$ miles the third day. How many miles did he travel in all?

2. In 3 boxes of candy, there are $2\frac{5}{8}$ lb., $3\frac{5}{6}$ lb., and $4\frac{2}{3}$ lb. How many pounds of candy are there in all?

3. John started out to walk to a town $6\frac{1}{5}$ miles away. After he had gone $4\frac{2}{3}$ miles, how many more miles did he have to walk to reach the town?

4. Jane is $10\frac{1}{6}$ years old. Mary is $8\frac{2}{3}$ years old. What is the difference in their ages?

5. Morris is $9\frac{3}{4}$ years old and Otto is $2\frac{5}{6}$ years younger. How old is Otto?

6. In selling coffee at 35¢ a pound, a grocer gained $8\frac{5}{8}$¢ a pound. How much did the coffee cost him?

7. I have cut $4\frac{7}{12}$ yd. from a piece of cloth that measured $8\frac{2}{9}$ yd. How much cloth is left?

8. John has \$3.24 and Frank has $\frac{5}{6}$ as much as John. How much has Frank?

9. In one piece of cloth there are $4\frac{1}{6}$ yd. Another piece has $3\frac{3}{5}$ times as many yards. How many yards are there in the second piece?

10. A grocer bought $4\frac{1}{5}$ bu. of apples and sold $\frac{5}{7}$ of them. How many bushels did he sell? How many did he have left?

READING AND WRITING DECIMAL FRACTIONS

31. Oral Exercises.

United States Money

10 mills = 1 cent.
10 cents = 1 dime.
10 dimes = 1 dollar.

1. What part of a dime is 1 cent?
2. What part of a dollar is 1 dime?
3. What part of a dollar is 1 cent?
4. What part of a cent is 1 mill?
5. What part of a dime is 1 mill?
6. What part of a dollar is 1 mill?

5 cents is 5 hundredths of a dollar and is written \$.05.
12 cents is 12 hundredths of a dollar and is written \$.12.

A fraction in which both the numerator and the denominator are expressed is called a **common fraction.** $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{5}{9}$, and $\frac{11}{17}$ are common fractions.

A fraction whose denominator is 10, 100, 1,000 (or 1 followed by any number of naughts) is a **decimal fraction.** The denominator is expressed by a **decimal point** (.).
One tenth is written .1. It is a one-place decimal.
One hundredth is written .01. It is a two-place decimal.
One thousandth is written .001. It is a three-place decimal.

In reading decimal fractions, we count the number of places to the right of the decimal point. One place is read "tenths," two places "hundredths," and three places "thousandths."
.3 is read "three tenths."
.24 is read "twenty-four hundredths."
.06 is read "six hundredths."
.256 is read "two hundred fifty-six thousandths."
.035 is read "thirty-five thousandths."
.207 is read "two hundred seven thousandths."
.009 is read "nine thousandths."

7. Read the following decimal fractions:

.25
.025
.4
.240
.029
.3
.11
.209
.07
.9
.003
.017
.625
.407
.06
.075
.8
.069
.027
.75
.005
.909
.09
.255
.007

32. Written Exercises.

To express the decimal fraction .25 as a common fraction, we write 25 as the numerator above the line and 100 as the denominator. Thus: $\frac{25}{100}$.

Notice that the denominator is 1 followed by as many naughts as there are decimal places.

1. Write the decimal fractions in Ex. 7 above as common fractions.

Decimal fractions are generally called *decimals*.

Write the following as decimals:

2. Twelve hundredths.

3. Forty-five hundredths.

4. Three hundred four thousandths.

5. Four hundred eighteen thousandths.

6. Sixty-three hundredths.

7. Eight tenths.

8. Eighteen hundredths.

9. Seventy-four hundredths.

10. Two hundred twenty-one thousandths.

11. Sixteen hundredths.

Express as decimals:

12. Six hundred two thousandths.

13. Four tenths.

14. Ten hundredths.

15. Seventeen thousandths.

16. Eighty-six thousandths.

17. Three hundred twenty-seven thousandths.

18. Nine thousandths.

19. Thirty-eight hundredths.

20. Five hundred six thousandths.

Change the following to the form of decimals:

21. 96 thousandths.

22. 28 hundredths.

23. 502 thousandths.

24. 7 tenths.

25. 4 hundredths.

26. 3 thousandths.

27. 250 thousandths.

28. 19 thousandths.

29. 57 hundredths.

30. 13 thousandths.

REDUCING COMMON FRACTIONS TO DECIMAL FRACTIONS

33. Written Exercises.

1. Reduce $\frac{1}{2}$ to a decimal.

$\frac{1}{2}$ may be read "1 divided by 2."

$$2\underline{)1.0}$$

$$.5$$ *Ans.* (Read the answer.)

2. Reduce $\frac{3}{4}$ to a decimal.

$$4\underline{)3.00}$$

$$.75$$ *Ans.* (Read the answer.)

3. Reduce $\frac{7}{125}$ to a decimal.

$$\begin{array}{rl}
.056 & \textit{Ans.}\\
125\overline{)7.000} & \\
\underline{6\,25} & \\
750 & \\
\underline{750} &
\end{array}$$

To reduce a common fraction to a decimal, *write the numerator with a decimal point after it. Place the decimal point in the quotient directly above the decimal point in the dividend. Divide by the denominator, annexing to the dividend as many naughts as are needed.*

34. Oral Exercises.

At sight, reduce to decimals:

1. $\frac{1}{4}$
2. $\frac{3}{4}$
3. $\frac{1}{2}$
4. $\frac{1}{5}$
5. $\frac{1}{20}$
6. $\frac{2}{5}$
7. $\frac{7}{10}$
8. $\frac{4}{5}$
9. $\frac{1}{20}$
10. $\frac{1}{50}$

35. Written Exercises.

Reduce to decimal fractions:

1. $\frac{3}{8}$
2. $\frac{4}{25}$
3. $\frac{17}{20}$
4. $\frac{9}{15}$
5. $\frac{5}{8}$
6. $\frac{19}{25}$
7. $\frac{3}{40}$
8. $\frac{19}{20}$
9. $\frac{9}{16}$
10. $\frac{6}{25}$
11. $\frac{2}{25}$
12. $\frac{17}{25}$
13. $\frac{47}{50}$
14. $\frac{11}{20}$
15. $\frac{13}{40}$
16. $\frac{17}{50}$
17. $\frac{7}{10}$
18. $\frac{37}{40}$
19. $\frac{1}{40}$
20. $\frac{25}{40}$

MIXED DECIMALS

36. Oral Exercises.

A **mixed decimal** is one that consists of a whole number and a decimal fraction.

17.25 is a mixed decimal. It is read "seventeen and twenty-five hundredths."

The decimal point is always written between the whole number and the decimal. It is read "and."

1. Read the following:

18.4	16.26	2.04	3.256	10.07
24.003	108.07	25.036	20.010	83.067

2. Read:

90.507	49.37	10.001	7.071	800.08
70.004	208.04	19.019	26.704	80.008

37. Written Exercises.

1. Write each of the mixed decimals in Exercise 36 as a mixed number.

For instance, 18.4 is written $18\frac{4}{10}$, as a mixed number.

Write in figures the following mixed decimals:

2. Four and six tenths.

3. Sixteen and twenty-four hundredths.

4. Eighty and forty-six hundredths.

5. Seventy-three and two hundred seventy-nine thousandths.

6. Sixty-four and sixty-four hundredths.

7. Fifty-nine and nine tenths.

8. Forty and forty hundredths.

9. Fourteen and four hundredths.

10. Twenty and thirty-three thousandths.

11. Two hundred sixty and five hundredths.

12. Twelve and twelve thousandths.

13. Thirty and three thousandths.

14. Four hundred fifty and three hundredths.

15. Forty-seven and ninety thousandths.

38. Written Exercises.

Reduce $3\frac{2}{25}$ to a mixed decimal.

We first reduce the fraction $\frac{2}{25}$ to a decimal:

$$\begin{array}{r} .08 \\ 25\overline{)2.00} \\ \underline{2.00} \end{array} \qquad \frac{2}{25} = .08 \qquad 3\frac{2}{25} = 3.08. \quad \textit{Ans.}$$

To reduce a mixed number to a mixed decimal, *reduce the fraction to a decimal and then write that decimal after the whole number.*

Reduce to mixed decimals:

1. $2\frac{4}{5}$
2. $12\frac{3}{8}$
3. $13\frac{5}{8}$
4. $15\frac{6}{25}$
5. $12\frac{11}{20}$
6. $4\frac{3}{50}$
7. $6\frac{3}{4}$
8. $9\frac{11}{40}$
9. $20\frac{21}{40}$
10. $22\frac{1}{20}$
11. $13\frac{5}{8}$
12. $16\frac{24}{25}$
13. $12\frac{3}{40}$
14. $25\frac{7}{50}$
15. $22\frac{19}{20}$
16. $308\frac{1}{25}$
17. $47\frac{1}{40}$
18. $91\frac{1}{50}$
19. $73\frac{7}{8}$
20. $200\frac{1}{5}$

REDUCING DECIMAL FRACTIONS TO COMMON FRACTIONS

39. Written Exercises.

Reduce .12 to a common fraction in its lowest terms.

$$.12 = \frac{12}{100} = \frac{3}{25}. \quad \textit{Ans.}$$

To reduce a decimal to a common fraction in its lowest terms, *write the decimal as a common fraction and reduce it to its lowest terms.*

Reduce to common fractions in their lowest terms:

1. .16
2. .64
3. .32
4. .875
5. .016
6. .35
7. .128
8. .064
9. .005
10. .06

11. .8
12. .56
13. .025
14. .075
15. .004
16. .124
17. .375
18. .08
19. .04
20. .256
21. .625
22. .250
23. .032
24. .008
25. .048

DENOMINATE UNITS

40. Written Problems.

1. Draw a rectangle 6 inches by 4 inches.
Divide the rectangle into 1-inch squares.
How many squares are there?

2. With heavy lines, divide the same rectangle into 2-inch squares. How many 2-inch squares can you make?

How many square inches are there in a 2-inch square?

What is the difference between a 2-inch square and two inch squares?

3. By a diagram show the difference between 3 two-inch squares and a 3-inch square.

4. How many inch squares can I cut from a sheet of cardboard 18 in. by 24 in.? How many 2-inch squares could be cut from the sheet of cardboard?

5. A room is 18 ft. long and 16 ft. wide. How many square feet are there in the area of the ceiling? How many 2-foot squares will be required for a metal ceiling for this room?

6. From a piece of linen 1 yd. wide and $1\frac{1}{2}$ yd. long, how many 9-inch tea napkins could be cut?

7. Find the area of the surface of a blackboard $18\frac{2}{3}$ ft. long by $3\frac{3}{4}$ ft. wide.

8. A grocer bought a can containing 5 gallons of olive oil. He put the oil into bottles which held $\frac{1}{2}$ pint each. How many bottles did he use? How much did he receive for the oil at $.27 a bottle?

9. Jane paid $3.60 for a 5-yard piece of damask with which to make towels. How many towels 30 inches long could she make from the piece? How much would each towel cost?

10. At $.32 a pound, what would be the cost of two turkeys weighing 9 lb. 4 oz. and 14 lb. 5 oz.?

11. How many portions of $\frac{1}{3}$ of a pint each can be made from 5 gal. 2 qt. of ice cream?

12. How much would 3 lb. 4 oz. of steak cost at 28 cents a pound?

13. From a piece of cardboard 24 in. by 18 in. how many small cards, each 4 in. by 3 in., could be cut?

BILLS

41. Oral Exercises.

Business men send to their customers bills for goods delivered, when cash is not paid at the time of the purchase.

Every bill should show clearly the following:

1. Place of sale.
2. Date of bill.
3. Name and address of seller.
4. Name and address of buyer.
5. Dates of different purchases.
6. Quantity, name, price, and total cost of each item.

Remember that if a purchase amounts to 24½ cents (as in the seventh item in the bill on page 42), it is charged as 25 cents.

7. Total amount of bill.

There are several correct forms of bills. In some, the term "Bought of" is used, followed by the name of the seller. In others the term "Sold to" is followed by the name of the buyer.

Mrs. Chas. Wilson receives from Henry Waltman & Bros., grocers, the following bill for goods delivered:

HENRY WALTMAN & BROS.
Grocers
463 Sixth Av.
New York, Feb. 1, 1917

Sold to Mrs. Chas. Wilson
1034 Bedford Av.

1917							
Jan.	5	3 lb. Butter	.38	1	14		
		2 doz. Eggs	.47		94		
		1 box Silicon			20	2	28
"	12	1 pk. Potatoes			55		
		2 cans Sardines	.18		36		91
"	18	½ pt. Cream	.28		14		
		3½ lb. Rice	.07		25		
		2 lb. Coffee	.35		70	1	09
						4	28
		Received payment, Feb. 10, 1917, Henry Waltman & Bros. per C. F.					

The column containing .38, .47, etc., is called the *price column.*

The amounts $1.14, .94, etc., are called *extensions.*

The amount of sales for each day is found by adding the various items and is placed in the right-hand column.

The numbers in the right-hand column are added to give the amount of the bill.

When the bill is paid, a receipt is given by the company. The initials C. F. are those of the clerk who stamps the date of payment and receipts the bill for the company.

When only *one article* of a kind is purchased, make no entry in the price column, but place the amount in the extension column.

The following heading is also correct, and is used as frequently as the other:

Philadelphia, Pa.
Nov. 1, 1917

Mr. John L. Thomson
682 Chestnut St.

Bought of J. C. STEARNS & CO.
Grocers
1284 Market St.

Oct.	6	3 lb. Coffee	.34	1	02		
		2 lb. Butter	.28		56		
		3½ lb. Cheese	.22		77	2	35
"	11	2 pk. Potatoes	.35		70		
		7½ lb. Sugar	.06		45	1	15
"	16	1 lb. Tea			60		
		3 cans Soup	.20		60	1	20
						4	70
		Received payment, Nov. 16, 1917 J. C. Stearns & Co. M. C. B.					

42. Written Exercises.

1. The Stevens Drug Co., of 684 Fulton St., Brooklyn, N. Y., sends your father, or some other member of the family, a bill for the following goods purchased during January, 1917:

Jan. 6: 2 toothbrushes @ 35¢; 1 bottle alcohol, 75¢; 3½ doz. quinine pills @ 12¢ a dozen; 3 cakes toilet soap @ 8¢.

Jan. 15: 3 tubes tooth paste @ 24¢; 1 prescription # 13,186, 65¢.

Jan. 27: 1 can benzine, 13¢; 2 thermos bottles @ $1.25; 3 bottles violet perfume @ 55¢.

Rule your paper. Make out the above bill, dating it Feb. 1, 1917. Receipt it on Feb. 5, 1917.

2. Your butcher sends your neighbor a bill for the following goods delivered at different dates during the month:

$2\frac{1}{2}$ lb. sirloin steak, $2\frac{3}{4}$ lb. lamb chops, $1\frac{3}{4}$ lb. liver, $1\frac{1}{4}$ lb. bacon, $5\frac{3}{4}$ lb. leg of lamb, $6\frac{1}{2}$ lb. corned beef, $3\frac{1}{2}$ lb. stew meat, $3\frac{1}{4}$ lb. Deerfoot sausages, $2\frac{1}{4}$ lb. frankfurters.

Find out the current prices for these goods and write the bill. Receipt the bill.

3. On Sept. 15, the principal of our school bought from the Manhattan Supply Co., 115 Franklin St., New York: $1\frac{1}{2}$ doz. table forks at $1.42 a dozen; $1\frac{1}{2}$ doz. table knives at $2.50 a dozen; 3 doz. teaspoons at $.75 a dozen; $\frac{1}{4}$ doz. tablespoons at $1.50 a dozen.

The bill was made out and sent Oct. 1. Our principal paid Joseph Coleman, a clerk, the amount of the bill Oct. 10.

Make out and receipt the bill.

4. Mr. Thomas Reid of 315 Lafayette St., Newark, N. J., bought the following goods from Hanan & Sons, 419 Broadway, New York:

Jan. 3, 1917: 2 pairs rubbers at $.95 a pair; 3 pairs shoes at $4.50 a pair; 1 box shoe polish $.25; and 6 pairs shoe laces at $.05.

Jan. 20: 2 pairs slippers at $3.75 a pair and 1 pair slipper buckles at $1.25.

The bill was made out and sent to Mr. Reid Jan. 31. He paid the bill Feb. 15, to Charles Frank, a clerk, who receipted it.

Make out the bill and receipt it.

43. Written Problems.

1. A dealer paid $7.29 for oranges. They cost 27 cents a dozen. How many oranges did he buy?

2. How many bushels of potatoes at 92 cents a bushel should I give in exchange for 46 bushels of wheat at 94 cents a bushel?

3. Tom is $10\frac{2}{3}$ years old. James is $2\frac{3}{4}$ years younger. How old is James?

4. Fred is $4\frac{1}{5}$ years older than Tom (Ex. 3). How old is Fred?

5. If $28\frac{1}{8}$ yd. of muslin are used in making 3 dresses of the same size, how many yards are used for each dress?

6. Five and a half yards make a rod. How many rods are there in $30\frac{5}{8}$ yards?

7. A launch goes 90 miles in $5\frac{1}{7}$ hours. How far will it go in one hour at that rate?

8. Central Park in the City of New York contains 842 acres. Prospect Park contains $\frac{5}{8}$ as many acres. How many acres are there in Prospect Park?

9. The dividend is 4,336 and the quotient is 271. What is the divisor?

10. An automobile was driven $120\frac{1}{6}$ miles and then returned $68\frac{7}{10}$ miles. How far was the automobile then from the starting point?

11. How far has the automobile (Ex. 10) traveled on this trip?

12. From a roll of ribbon containing $9\frac{1}{2}$ yd. I cut a piece $6\frac{3}{4}$ yd. long. What is the piece worth at 32¢ a yard? What is the remainder of the roll of ribbon worth?

13. A garage keeper bought 3 bbl. of gasoline, containing $50\frac{1}{2}$ gal., $49\frac{3}{4}$ gal., and $52\frac{1}{8}$ gal. He sold to one customer 28 gal. and to another 13 gal. How much did he have left?

14. He sold the remainder at 22¢ a gallon. How much did he receive for it?

THE HAT DEALER

15. A dealer bought 36 dozen men's hats at $27 a dozen. How much did they all cost him? What was the cost of each hat?

16. He sold $\frac{2}{3}$ of them at $3.25 each. How much did he receive for this lot?

17. What did he receive for all the others if he sold them at $2.50 each?

18. How much did he make on the sale of the 36 dozen hats?

SECOND QUARTER

COUNTING

44. Oral Exercises.

1. Beginning with 9, count by 5's to 89.
2. Beginning with 8, count by 7's to 106.
3. Beginning with 2, count by 8's to 106.
4. Beginning with 3, count by 9's to 111.

ROMAN NOTATION

45. Written Exercises.

Write the following dates in Roman numerals:

1492. Columbus discovered America.
1607. The English settled at Jamestown.
1609. The Hudson River was discovered by Henry Hudson.
1620. The Pilgrims landed at Plymouth.
1623. New Amsterdam was settled by the Dutch.
1664. The English took possession of New Amsterdam.
1776. The Declaration of Independence was signed.
1899. The first wireless message was sent across the English Channel.
1903. The first motor-driven aëroplane was used.
1914. The Panama Canal was opened.

ADDITION

46. Oral Exercises.

At sight, give the sums of the following numbers:

1.	2.	3.	4.	5.
52	73	64	45	79
49	48	37	36	59

6. 57
38

7. 96
39

8. 68
48

9. 48
29

10. 95
18

11. 73
49

12. 66
37

13. 45
39

14. 67
27

15. 57
39

16. 74
18

17. 72
29

18. 46
28

19. 94
39

20. 53
18

47. Written Exercises.

Add and test, timing yourself on each example:

1. 73,895
67,958
96,874
38,963
75,898
37,675
29,587
43,759
57,936
28,495

2. 69,873
47,938
78,504
93,768
59,979
46,853
95,694
38,568
27,957
85,794

3. 76,914
47,875
59,073
98,948
36,795
28,564
87,859
35,976
94,895
67,549

4. 58,974
74,833
85,397
69,578
43,994
76,859
38,567
92,734
38,657
40,395

5. 27,856
49,472
76,938
57,859
49,387
94,892
35,675
47,968
59,432
79,582

6. 32,534
47,627
59,876
94,895
68,879
43,574
95,479
93,586
95,484
37,586

7. 2,874
47,368
758,947
5,937
584,957
363,875
797,865
9,845
623,498
598,639

8. 129,637
857,846
386,958
7,698
859,348
67,534
698,879
543,787
65,964
274,964

9. 87,386
949,279
8,957
388,496
83,995
485,793
649,347
865,985
74,697
789,549

10. $ 7,638.09
59.87
6,587.53
956.94
9,469.38
745.75
3,975.18
9.62
87,647.38
18,963.57

11. $83,954.65
19,732.59
907.80
86.47
5,375.62
43,527.98
698.36
43.79
8,879.43
560.08

12. $54,932.16
8,595.87
986.54
17,074.78
5,657.95
849.63
9,538.37
95.68
7.83
968.59

13. $ 6,793.95
78,747.94
9,568.73
598.76
18,798.78
6,357.94
847.58
95.87
5,937.64
267.68

14. $93,875.16
9,543.95
649.87
9,659.84
697.58
17,586.32
5,907.93
86.95
9,576.87
858.39

15. $ 6,387.92
976.87
95.58
1,789.36
94,516.74
6,875.65
984.39
5,796.87
17,889.95
4,975.49

16. Add:

Forty-seven million nine hundred seventeen thousand six hundred fifty-nine,

Ninety-eight million seven hundred thirty-five thousand eight hundred twenty-seven,

Eighteen million four hundred seventy-nine thousand nine hundred thirteen,

Seventy-four million six hundred sixty-eight thousand five hundred ninety-seven,

Thirty-nine million seven hundred ninety-six thousand six hundred seventy-eight,

Fifty-seven million nine hundred eighty-four thousand eight hundred sixty-nine,

Eighty-five million eight hundred seventy-five thousand nine hundred fifty-eight.

17. Add:

Nineteen dollars and eight cents,
Five thousand eighty dollars and sixty cents,
Nine hundred seventy-eight dollars and nineteen cents,
Seven dollars and ninety-six cents,
Eight thousand seven hundred fifty-six dollars and seventy-five cents,
Eight hundred nine dollars and forty-eight cents,
Ninety-five dollars and eighty-seven cents.

18. Add:

Fourteen dollars and seventy-nine cents,
Six thousand ninety-eight dollars and eight cents,
Three hundred seventy-six dollars and forty-five cents,
Eighty-four dollars and seventy-three cents,
Seven thousand four hundred thirty-eight dollars,
Ninety-six cents.

SUBTRACTION

48. Oral Exercises.

Find the amount of change in each of the following:

	Amount of Purchase	Amount Given to Storekeeper	Change		Amount of Purchase	Amount Given to Storekeeper	Change
1.	$1.13	$ 1.50		14.	$1.58	$ 1.75	
2.	.87	1.00		15.	2.26	2.50	
3.	1.68	2.00		16.	3.67	10.00	
4.	1.59	1.75		17.	1.32	1.50	
5.	1.38	5.00		18.	3.27	5.00	
6.	2.07	2.25		19.	2.13	2.25	
7.	2.75	10.00		20.	1.37	2.00	
8.	.13	1.00		21.	4.33	10.00	
9.	1.23	2.00		22.	2.17	2.50	
10.	1.67	1.75		23.	2.64	5.00	
11.	2.18	2.25		24.	8.65	20.00	
12.	2.46	5.00		25.	1.12	2.00	
13.	2.32	2.50		26.	1.85	10.00	

49. Written Exercises.

1.
$$\begin{array}{r} 2{,}604{,}935 \\ -\ 1{,}594{,}978 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 1{,}900{,}267 \\ -\ 1{,}876{,}389 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 5{,}060{,}573 \\ -\ 2{,}653{,}978 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 8{,}327{,}524 \\ -\ 3{,}278{,}265 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 8{,}000{,}635 \\ -\ 2{,}677{,}598 \\ \hline \end{array}$$

6.
$$\begin{array}{r} 3{,}690{,}312 \\ -\ 1{,}798{,}576 \\ \hline \end{array}$$

7.
$$\begin{array}{r} 1{,}402{,}360 \\ -\ 1{,}195{,}387 \\ \hline \end{array}$$

8.
$$\begin{array}{r} 9{,}362{,}043 \\ -\ 7{,}187{,}695 \\ \hline \end{array}$$

9.
$$\begin{array}{r} 9{,}490{,}761 \\ -\ 5{,}787{,}875 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 8{,}204{,}732 \\ -\ 5{,}167{,}977 \\ \hline \end{array}$$

11.
$$\begin{array}{r} \$4{,}763.18 \\ -\ 3{,}787.29 \\ \hline \end{array}$$

12.
$$\begin{array}{r} \$9{,}268.21 \\ -\ 3{,}288.73 \\ \hline \end{array}$$

13. $\begin{array}{r} 7{,}525{,}032 \\ -\ 5{,}237{,}657 \\ \hline \end{array}$

14. $\begin{array}{r} 3{,}492{,}630 \\ -\ 1{,}597{,}385 \\ \hline \end{array}$

15. $\begin{array}{r} \$5{,}070.36 \\ -\ \ 4{,}785.77 \\ \hline \end{array}$

16. How much less than 9,013,265 is 7,958,658?

17. Which is greater and how much: 5,931,287 or 5,819,398?

18. From 4,813,293 subtract 1,975,897.

19. Find the difference between 7,009,016 and 4,932,849.

20. Subtract 72,958,264 from 80,010,501.

MULTIPLICATION

50. Oral Exercises.

Give answers at sight:

1. $\begin{array}{r} 25 \\ \times\ 8 \\ \hline \end{array}$

2. $\begin{array}{r} 91 \\ \times\ 8 \\ \hline \end{array}$

3. $\begin{array}{r} 50 \\ \times\ 90 \\ \hline \end{array}$

4. $\begin{array}{r} 71 \\ \times\ 7 \\ \hline \end{array}$

5. $\begin{array}{r} 50 \\ \times\ 60 \\ \hline \end{array}$

6. $\begin{array}{r} 106 \\ \times\ 8 \\ \hline \end{array}$

7. $\begin{array}{r} 125 \\ \times\ 6 \\ \hline \end{array}$

8. $\begin{array}{r} 61 \\ \times\ 8 \\ \hline \end{array}$

9. $\begin{array}{r} 505 \\ \times\ 9 \\ \hline \end{array}$

10. $\begin{array}{r} 25 \\ \times\ 30 \\ \hline \end{array}$

11. $\begin{array}{r} 12 \\ \times\ 80 \\ \hline \end{array}$

12. $\begin{array}{r} 606 \\ \times\ 8 \\ \hline \end{array}$

13. $\begin{array}{r} 15 \\ \times\ 40 \\ \hline \end{array}$

14. $\begin{array}{r} 81 \\ \times\ 7 \\ \hline \end{array}$

15. $\begin{array}{r} 250 \\ \times\ 20 \\ \hline \end{array}$

16. $\begin{array}{r} 707 \\ \times\ 6 \\ \hline \end{array}$

17. $\begin{array}{r} 33 \\ \times\ 5 \\ \hline \end{array}$

18. $\begin{array}{r} 808 \\ \times\ 9 \\ \hline \end{array}$

19. $\begin{array}{r} 51 \\ \times\ 9 \\ \hline \end{array}$

20. $\begin{array}{r} 505 \\ \times\ 7 \\ \hline \end{array}$

51. Written Exercises.

1. $\begin{array}{r} 687{,}659 \\ \times\ \ 93 \\ \hline \end{array}$

2. $\begin{array}{r} 235{,}984 \\ \times\ \ 78 \\ \hline \end{array}$

3. $\begin{array}{r} 68{,}573 \\ \times\ 907 \\ \hline \end{array}$

4. $\begin{array}{r} 50{,}684 \\ \times\ 608 \\ \hline \end{array}$

5. $\begin{array}{r} \$76{,}895.37 \\ \times\ \ 63 \\ \hline \end{array}$

6. $\begin{array}{r} \$85{,}693.75 \\ \times\ \ 87 \\ \hline \end{array}$

7. 397,865 × 56

8. 93,076 × 438

9. 59,608 × 567

10. 37,008 × 295

11. 29,765 × 405

12. 76,905 × 673

13. 83,764 × 854

14. 95,067 × 926

15. \$39,876.84 × 95

16. 58,976,439 × 49

17. 38,976,075 × 74

18. 29,765,879 × 93

DIVISION

52. Oral Exercises.

Divide at sight:

1. 12)960
2. 9)1,872
3. 5)1,560
4. 9)1,080
5. 9)963
6. 7)3,549
7. 12)360
8. 6)4,230
9. 5)2,525
10. 12)480
11. 9)2,745
12. 7)497
13. 8)488
14. 8)856
15. 7)567
16. 8)568
17. 7)763
18. 5)750
19. 8)408
20. 12)2,424

53. Written Exercises.

Divide:

1. 58)236,327
2. 96)185,932
3. 39)168,007
4. 93)638,694
5. 48)253,070
6. 67)425,093
7. 304)90,072
8. 508)461,005
9. 806)750,038
10. 90)581,005
11. 70)523,067
12. 80)898,005
13. 267)389,721
14. 458)285,392
15. 596)381,065

54. Oral Exercises.

	45		70
	60		50
1. Find	1	**4.** Find	40
$\frac{2}{5}$ of	35	$\frac{3}{10}$ of	80
	15		120
2. Find	25	**5.** Find	60
$\frac{3}{5}$ of	10	$\frac{7}{10}$ of	110
	30		30
3. Find	55	**6.** Find	20
$\frac{4}{5}$ of	40	$\frac{9}{10}$ of	1
	20		90

APPROXIMATE ANSWERS

55. Exercises.

In the following examples, give answers that are as nearly exact as possible. Test your answers, using pencil and paper.

1. Find the cost of 98 Geographies at $1.10 each.

2. What will be the cost of 19 ft. 11 in. of brass rod at $.60 a foot?

3. Mr. Miller paid $195 for a horse, $310 for a wagon, and $48 for harness and blankets. How much did he spend in all?

4. A man divided $74.85 equally among his 3 sons. How much did each son receive?

5. During the year 1914 there were 14,524 fires in the City of New York. London had 10,893 fires during the same year. How many more fires were there in New York than in London in the year 1914?

6. Find the cost of 3 pk. 7 qt. of potatoes at 52¢ a peck.

7. At $3.98 a pair, how many pairs of shoes could a dealer buy with $59.75?

8. A tank contains 2,056 gal. of water. How many times could it be filled from a supply of 10,172 gal.?

SHORT METHODS; MULTIPLYING BY 25

56. Written Exercises.

What is the shortest way of multiplying a number by 100?

What part of 100 is 25?

What, then, is the short method of multiplying a number by 25?

Multiply 28 by 25.

$$28 \times 25 = 2800 \div 4 = 700.$$ *Ans.*

Write answers:

1. 16×25
2. 24×25
3. 32×25
4. 48×25
5. 64×25
6. 36×25
7. 44×25
8. 52×25
9. 68×25
10. 72×25
11. 248×25
12. 280×25
13. 448×25
14. 724×25
15. 840×25
16. 368×25
17. 324×25
18. 428×25
19. 284×25
20. 560×25

HELPS IN FACTORING

57. Oral Exercises.

Remember that

1. When the figure in units' place is an even number or 0, the number is exactly divisible by 2.

2. When the figure in units' place is 5 or 0, the number is exactly divisible by 5.

3. When the figure in units' place is 0, the number is exactly divisible by 10.

4. When the sum of the figures is divisible by 3, the number is exactly divisible by 3.

5. When the sum of the figures is divisible by 9, the number is exactly divisible by 9.

Which of the following numbers are exactly divisible by 2? By 5? By 3? By 10? By 9?

38	45	75	121	48
70	243	135	138	150
171	258	486	910	256
324	225	450	234	117

58. Written Exercises.

Reduce to lowest terms:

1. $\frac{77}{126}$	**4.** $\frac{66}{121}$	**7.** $\frac{168}{432}$	**10.** $\frac{360}{552}$
2. $\frac{615}{915}$	**5.** $\frac{90}{555}$	**8.** $\frac{180}{852}$	**11.** $\frac{75}{375}$
3. $\frac{90}{342}$	**6.** $\frac{105}{615}$	**9.** $\frac{72}{528}$	**12.** $\frac{80}{128}$

ADDITION AND SUBTRACTION OF FRACTIONS

59. Written Exercises.

1. $\frac{3}{4} + \frac{7}{12} + \frac{11}{42} + \frac{1}{2}$

2. $\frac{5}{7} + \frac{12}{21} + \frac{5}{6} + \frac{11}{12}$

3. $\frac{3}{5} + \frac{7}{8} + \frac{9}{20} + \frac{1}{12}$

4. $\frac{9}{28} + \frac{1}{6} + \frac{3}{7} + \frac{3}{8}$

5. $\frac{17}{32} + \frac{1}{2} + \frac{7}{20} + \frac{5}{8}$

6. $\frac{5}{12} + \frac{7}{9} + \frac{1}{6} + \frac{11}{30}$

7. $\frac{3}{5} + \frac{17}{40} + \frac{1}{8} + \frac{2}{3}$

8. $\frac{7}{11} + \frac{11}{12} + \frac{3}{4} + \frac{5}{6}$

9. $\frac{5}{18} + \frac{3}{8} + \frac{11}{12} + \frac{2}{3}$

10. $\frac{3}{7} + \frac{25}{49} + \frac{2}{3} + \frac{1}{7}$

11. $38\frac{11}{17} \times 60\frac{15}{34} + \frac{5}{51}$

12. $89\frac{3}{8} + 76\frac{11}{16} + 17\frac{1}{2}$

13. $75\frac{3}{11} + 36\frac{4}{7} + 69$

14. $53\frac{2}{3} + 19\frac{5}{8} + 17\frac{1}{12}$

15. $67\frac{11}{24} + 58\frac{3}{4} + 45\frac{7}{12}$

16. $23\frac{2}{5} + 58\frac{7}{8} + 19\frac{11}{40}$

17. $49\frac{1}{15} + 25\frac{4}{25} + 23\frac{11}{60}$

18. $18\frac{1}{2} + 93\frac{9}{11} + \frac{3}{4}$

19. $7\frac{2}{20} + 39\frac{7}{30} + 85\frac{6}{25}$

20. $79\frac{8}{11} + 64\frac{7}{121} + 13\frac{1}{2}$

21.	**22.**	**23.**	**24.**	**25.**
$58\frac{2}{3}$	$92\frac{3}{4}$	$597\frac{1}{8}$	$403\frac{1}{5}$	$710\frac{2}{5}$
$19\frac{1}{2}$	$39\frac{5}{8}$	$694\frac{1}{6}$	$291\frac{1}{3}$	$293\frac{1}{2}$
$\underline{41\frac{2}{5}}$	$\underline{10\frac{3}{5}}$	$\underline{311\frac{2}{3}}$	$\underline{700\frac{5}{12}}$	$\underline{597\frac{1}{6}}$

$$\begin{array}{lrlrlrlrlr}
\textbf{26.} & 67\frac{3}{5} & \textbf{27.} & 112\frac{7}{8} & \textbf{28.} & 163\frac{3}{4} & \textbf{29.} & 27\frac{5}{12} & \textbf{30.} & 87\frac{1}{8} \\
 & 48\frac{2}{3} & & 36\frac{5}{6} & & 59\frac{1}{6} & & 16\frac{2}{3} & & 36\frac{4}{5} \\
 & \underline{97\frac{9}{10}} & & \underline{22\frac{2}{3}} & & \underline{87\frac{3}{8}} & & \underline{98\frac{3}{5}} & & \underline{29\frac{7}{10}}
\end{array}$$

60. Written Exercises.

1. $\frac{2}{3} - \frac{5}{11}$
2. $\frac{17}{56} - \frac{3}{16}$
3. $\frac{5}{22} - \frac{4}{33}$
4. $\frac{27}{40} - \frac{13}{24}$
5. $\frac{17}{132} - \frac{2}{33}$
6. $\frac{17}{36} - \frac{7}{24}$
7. $\frac{6}{42} - \frac{7}{63}$
8. $\frac{7}{48} - \frac{5}{36}$
9. $\frac{4}{27} - \frac{6}{45}$
10. $\frac{5}{9} - \frac{2}{7}$
11. $\frac{11}{14} - \frac{8}{21}$
12. $\frac{13}{21} - \frac{6}{35}$
13. $83 - 8\frac{2}{3}$
14. $161 - 19\frac{5}{7}$
15. $93\frac{2}{15} - 27\frac{4}{9}$
16. $60\frac{1}{3} - 37\frac{5}{8}$
17. $56\frac{5}{16} - 18\frac{17}{20}$
18. $49\frac{2}{9} - \frac{15}{36}$
19. $103\frac{5}{12} - 78\frac{19}{42}$
20. $70 - 35\frac{4}{9}$
21. $430\frac{3}{8} - 69\frac{27}{28}$
22. $700\frac{14}{15} - 58\frac{49}{50}$

$$\begin{array}{lrlrlrlrlr}
\textbf{23.} & 904\frac{1}{3} & \textbf{25.} & 891\frac{1}{6} & \textbf{27.} & 963\frac{3}{8} & \textbf{29.} & 701\frac{2}{3} & \textbf{31.} & 592\frac{3}{8} \\
 & \underline{-695\frac{2}{5}} & & \underline{-307\frac{3}{4}} & & \underline{-919\frac{3}{4}} & & \underline{-298\frac{3}{4}} & & \underline{-398\frac{2}{3}} \\
\textbf{24.} & 203\frac{1}{5} & \textbf{26.} & 100\frac{1}{8} & \textbf{28.} & 250\frac{3}{4} & \textbf{30.} & 101\frac{1}{8} & \textbf{32.} & 202\frac{1}{12} \\
 & \underline{-169\frac{2}{3}} & & \underline{-\ \ 79\frac{5}{6}} & & \underline{-168\frac{4}{5}} & & \underline{-\ \ 77\frac{1}{6}} & & \underline{-103\frac{1}{8}}
\end{array}$$

MULTIPLICATION AND DIVISION OF FRACTIONS

61. Written Exercises.

1. $2\frac{5}{8} \times 9\frac{3}{4} \times \frac{4}{26} \times \frac{2}{3}$
2. $3\frac{3}{4} \times \frac{5}{7} \times 1\frac{7}{9} \times 1\frac{2}{5}$
3. $2\frac{6}{11} \times 9\frac{7}{9} \times \frac{3}{4} \times 1\frac{2}{7}$
4. $1\frac{3}{5} \times 4\frac{1}{21} \times \frac{7}{32} \times 3\frac{1}{3}$
5. $2\frac{4}{7} \times 1\frac{13}{15} \times \frac{7}{10} \times 5\frac{1}{3}$
6. $5\frac{1}{3} \times \frac{9}{56} \times \frac{5}{18} \times \frac{7}{15}$
7. $7\frac{1}{2} \times \frac{5}{24} \times 2\frac{2}{5} \times \frac{1}{15}$
8. $15\frac{3}{4} \times \frac{2}{15} \times 3\frac{1}{9} \times 3\frac{1}{13}$
9. $8\frac{1}{6} \times 1\frac{19}{21} \times 9\frac{6}{14} \times \frac{3}{11}$
10. $\frac{7}{132} \times \frac{5}{9} \times \frac{11}{15} \times 1\frac{5}{7}$

11. $168 \times 8\frac{5}{8}$

12. $187 \times 6\frac{4}{11}$

13. $288 \times 9\frac{5}{12}$

14. $230 \times 23\frac{3}{10}$

15. $162 \times 10\frac{5}{9}$

16. $198 \times 9\frac{5}{6}$

17. $496 \times 19\frac{3}{4}$

18. $504 \times 97\frac{3}{7}$

19. $369 \times 104\frac{1}{3}$

20. $219 \times 49\frac{2}{3}$

62. Written Exercises.

1. $\frac{3}{8} \div 9$
2. $1\frac{3}{5} \div 24$
3. $2\frac{7}{9} \div 5$
4. $23\frac{1}{5} \div 4$
5. $\frac{8}{15} \div 6$
6. $12 \div 2\frac{2}{3}$
7. $25 \div 3\frac{1}{8}$
8. $15 \div 3\frac{1}{5}$
9. $24 \div 6\frac{2}{3}$
10. $18 \div 7\frac{7}{9}$
11. $\frac{3}{11} \div \frac{9}{22}$
12. $\frac{4}{15} \div 2\frac{2}{3}$
13. $7\frac{5}{7} \div 4\frac{4}{5}$
14. $\frac{7}{12} \div 1\frac{7}{18}$
15. $\frac{17}{18} \div 2\frac{4}{15}$
16. $3\frac{3}{8} \div 4\frac{4}{15}$
17. $3\frac{2}{5} \div \frac{8}{25}$
18. $1\frac{11}{12} \div 5\frac{1}{9}$
19. $6\frac{1}{8} \div 4\frac{2}{3}$
20. $5\frac{5}{6} \div 8\frac{3}{5}$

REDUCING A COMPLEX FRACTION TO A COMMON FRACTION

63. Written Exercises.

A fraction in which the numerator or the denominator, or both, are fractions or mixed numbers, is called **a complex fraction.**

The following are complex fractions:

$$\frac{\frac{2}{3}}{3} \qquad \frac{4}{\frac{4}{5}} \qquad \frac{\frac{2}{3}}{\frac{4}{5}} \qquad \frac{3\frac{1}{2}}{12} \qquad \frac{12}{3\frac{1}{2}} \qquad \frac{2\frac{2}{3}}{4\frac{5}{8}}$$

1. Reduce $\frac{\frac{1}{2}}{\frac{3}{5}}$ to a common fraction.

$$\frac{\frac{1}{2}}{\frac{3}{5}} = \frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \times \frac{5}{3} = \frac{5}{6}. \quad \textit{Ans.}$$

2. Reduce $\frac{3\frac{1}{2}}{5}$ to a common fraction.

$$\frac{3\frac{1}{2}}{5} = \frac{\frac{7}{2}}{5} = \frac{7}{2} \div 5 = \frac{7}{2} \times \frac{1}{5} = \frac{7}{10}. \quad \textit{Ans.}$$

3. Reduce $\frac{2\frac{2}{5}}{3\frac{1}{8}}$ to a common fraction.

$$\frac{2\frac{2}{5}}{3\frac{1}{8}} = \frac{\frac{12}{5}}{\frac{25}{8}} = \frac{12}{5} \div \frac{25}{8} = \frac{12}{5} \times \frac{8}{25} = \frac{96}{125}. \quad \textit{Ans.}$$

Reduce the following complex fractions to common fractions:

4. $\frac{\frac{2}{3}}{\frac{3}{4}}$ **6.** $\frac{\frac{2}{3}}{5}$ **8.** $\frac{\frac{6}{7}}{8}$ **10.** $\frac{2\frac{1}{3}}{4\frac{1}{2}}$ **12.** $\frac{3\frac{1}{8}}{15}$

5. $\frac{3}{\frac{3}{5}}$ **7.** $\frac{\frac{3}{5}}{\frac{7}{8}}$ **9.** $\frac{\frac{5}{8}}{\frac{7}{12}}$ **11.** $\frac{6\frac{2}{3}}{20}$ **13.** $\frac{3\frac{1}{3}}{4\frac{1}{6}}$

64. Oral Problems.

TYPE PROBLEM. A boy spends $\frac{2}{3}$ of his money. What part of his money is left?

His whole amount of money is $\frac{3}{3}$ of itself.
$\frac{3}{3}$ of his money $-$ $\frac{2}{3}$ of his money $=$ $\frac{1}{3}$ of his money.
$\frac{1}{3}$ of his money is left.

1. If a boy loses $\frac{3}{8}$ of his marbles, what fraction of his marbles is left?

2. If Helen spends $\frac{1}{2}$ and $\frac{1}{4}$ of her money, what part is left?

3. If Helen (Ex. 2) had 20 cents at first, how much did she spend? How much did she have left?

65. Written Problems.

1. John spent $\frac{1}{3}$ and $\frac{1}{5}$ of his money. What part of his money did he have left?

2. If John (Ex. 1) had 90 cents at first, how much money did he have left?

3. An upright pole was $\frac{1}{3}$ in the mud and $\frac{1}{4}$ in the water, and the remainder was above the water. What part of the pole was above the water?

4. If the pole (Ex. 3) was 72 feet long, how many feet were in the mud? How many feet were in the water? How many feet were above the water?

5. In a certain school $\frac{3}{8}$ of the children are under 10 years of age, $\frac{5}{12}$ are between the ages of 10 and 14 years, and the others are over 14. There are 504 children in the school. How many are over 14 years of age? How many are under 10 years of age? How many are between 10 and 14?

6. Mildred's mother had $581 in the bank. She spent $\frac{4}{7}$ of it for Mildred's piano. How much money did she then have left in the bank?

7. The receipts of a grocery store for the six days of a week were 30\frac{3}{4}$, 37\frac{1}{2}$, 34\frac{4}{5}$, 31\frac{1}{4}$, 28\frac{4}{5}$, and 39\frac{7}{10}$. What was the total of the week's receipts?

8. The expenses of the grocer (Ex. 7) were: for stock $121, for rent 15\frac{3}{4}$, for help 21\frac{4}{5}$, other expenses 16\frac{9}{10}$. What was the total expense?

9. What was the grocer's profit?

10. If flour costs 6\frac{3}{8}$ a barrel, how many barrels can be bought for 216\frac{3}{4}$?

66. Written Problems.

1. Reduce $\frac{2}{5}$ to a fraction whose denominator is 35.

2. Dick can jump 6$\frac{2}{3}$ feet. Jim can jump 1$\frac{1}{4}$ feet farther than Dick, and Sam can jump $\frac{5}{6}$ of a foot farther than Jim. How far can Jim and Sam each jump?

3. How many bottles holding 1$\frac{1}{7}$ pints each will be needed to bottle 112 pints of vinegar?

4. Jack made 2\frac{3}{5}$ a week selling papers. At that rate, how much did he earn in 4 weeks?

5. How much would Jack have left after buying a suit of clothes for $\$7\frac{3}{4}$ out of his earnings (Ex. 4)?

6. Philip bought apples at the rate of 12 for 10 cents and sold them at the rate of 2 for 3 cents. How much did he make on 5 dozen apples?

7. How many tons of coal at $\$6\frac{3}{4}$ a ton can be bought for \$54?

8. What number divided by $6\frac{2}{3}$ gives $3\frac{1}{3}$ for a quotient?

9. A grocer bought a barrel of vinegar containing $42\frac{3}{4}$ gal. He sold at one time $10\frac{1}{2}$ gal. and at another $15\frac{3}{8}$ gal. How much was left?

10. What was the remainder of the vinegar (Ex. 9) worth at 12 cents a gallon?

READING AND WRITING DECIMALS

67. Written Exercises.

Write:

1. Three and fourteen thousandths.
2. Fourteen and four tenths.
3. Seven thousandths.
4. Forty-nine thousandths.
5. Twenty and four hundredths.
6. Eighty-four thousandths.
7. Sixty and six tenths.
8. Two hundred sixty-four thousandths.
9. Eight hundredths.
10. Four hundred and eight tenths.
11. Three hundred twelve thousandths.
12. Six hundred and eighty-seven hundredths.

68. Oral Exercises.

A decimal of four places is read "ten-thousandths."

.0256 is read "two hundred fifty-six ten-thousandths."

The denominator of a decimal of four places is 10,000.

A decimal of five places is read "hundred-thousandths."

A decimal of six places is read "millionths."

1. Study the following table as a help in reading and writing decimals:

	WHOLE NUMBERS		Decimal Point	DECIMALS					
	Tens	Units		Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths
ORDER OF PLACES				1st	2d	3d	4th	5th	6th

2. Read the following:

.00017
.9005
8.60901
507.00507
9040.094
909.00009
.50007
50.0018
6.0505

.3007
.0241
.06705
8.0002
.00755
2.0708
13.04051
.01007
1.000012

.60101
20.0002
.041042
.00008
30.0303
20.00202
8.050055
.02006
40.0004

101.10161
90.09109
.0076
.00025
501.009
.40723
80.80081
.0807
.025025

69. Written Exercises.

Write the following decimals:

1. Six ten-thousandths.
2. Four thousand three hundred three hundred-thousandths.
3. Seventy and seven hundred-thousandths.
4. Seventy thousand six hundred-thousandths.
5. Seven hundred and nine hundredths.
6. Six hundred and six thousandths.
7. Five thousand three ten-thousandths.
8. Four thousand and eight ten-thousandths.
9. Eight hundred and one ten-thousandth.
10. Forty and forty-four hundred-thousandths.
11. Six and six hundred six ten-thousandths.
12. Ninety and nine thousand ninety ten-thousandths.
13. Four thousand eight hundred one hundred-thousandths.
14. Fifty and fifty-eight ten-thousandths.
15. Five thousand seven hundred-thousandths.
16. Nine hundred four hundred-thousandths.
17. One thousand sixty hundred-thousandths.
18. Seventeen hundred and seventeen thousandths.
19. Seventeen millionths.
20. Six thousand nine ten-thousandths.
21. Twelve thousand forty-three millionths.
22. Sixteen and sixteen millionths.
23. Sixty thousand nine hundred-thousandths.
24. Three thousand eighty and eighty-three ten-thousandths.
25. Four and forty millionths.

REDUCTION OF DECIMALS

70. Written Exercises.

Reduce the following decimals to common fractions:

1. .015
2. .0175
3. .016
4. .96
5. .0032
6. .9375
7. .1875
8. .0064
9. .0256
10. .004
11. .00125
12. .0008
13. .03125
14. .00625
15. .0128
16. .00512
17. .6875
18. .04375
19. .0005
20. .08125

Reduce the following common fractions to decimals:

21. $\frac{3}{16}$
22. $\frac{3}{500}$
23. $\frac{7}{5000}$
24. $\frac{11}{400}$
25. $\frac{13}{160}$
26. $\frac{15}{16}$
27. $\frac{15}{160}$
28. $\frac{5}{32}$
29. $\frac{7}{800}$
30. $\frac{25}{64}$

ADDITION OF DECIMALS

71. Written Exercises.

A certain railroad added the following extensions to its tracks: 3.025 miles, 2.16 miles, 328.9 miles, and 4.006 miles. How many miles were added?

$$\begin{array}{r} 3.025 \\ 2.16 \\ 328.9 \\ \underline{4.006} \\ 338.091 \end{array} \quad \textit{Ans.}$$

Write the numbers in a column, placing tenths under tenths, hundredths under hundredths, thousandths under thousandths, and decimal point under decimal point. Then add.

1. 62.04 + 306.028 + 7.052 + 90.9 + 71.006.
2. 38.4 + 24.08 + 72.62 + 6.075 + .09.
3. 6.003 + 19.75 + 106.8 + 12.086 + 23.09.
4. 57.6 + 9.043 + 22.73 + 10.009 + 4.3.
5. 17.403 + 28.6 + 37.55 + 6.001 + 36.430.

6. 8.08 + 17.206 + 43.8 + 9.27 + 200.5.

7. 74.24 + 6.909 + 209.3 + 19.005 + 14.366.

8. 90.1 + 4.601 + 18.07 + 5.662 + 301.50.

9. 4.365 + 27.05 + 217.04 + 9.5 + 44.069.

10. 56.09 + 8.006 + 68.077 + 16.44 + 8.7.

11. 30.06 + 2.905 + 363.4 + 868 + .0437.

12. 17.56 + 30.3 + 250.008 + 9.865 + 65.0063.

13. 119.099 + .0735 + 2.0609 + 320.8 + 16.016.

14. 450 + .003 + 90.9635 + 1.2 + 725.903.

15. 75.075 + .98 + 108.215 + .9875 + 860.86.

16. 8.08 + 972.9 + 809.925 + 72.9059 + 8.6345.

17. 825.9 + 6.375 + 8205 + 8.3007 + 62.757.

18. 68.05 + 2.9255 + 860.07 + 23.024 + 96.0009.

19. 365.79 + 22 + 67.8256 + 9.7532 + 28.07.

20. 37.025 + 1065 + 7.5008 + 27.53 + 9.6075.

21. 3.0075 + 250.87 + 312.00009 + 75.05.

22. .026 + 300.097 + 6.5 + 25.00003 + .2358.

23. 30.5 + .02005 + 72.868 + .00975 + 13.36.

24. 37.092 + .00708 + 9.3007 + 68.74005 + 86.

25. 2.9009 + 85.3 + 17.00008 + .0375 + 2.409.

26. .3044 + 18.707 + .08095 + 286.4 + 32.0401.

27. 62.475 + 8.0629 + .9308 + 4.00672 + 900.

28. 245.62 + 3.98046 + 21.9 + 360.75602 + .0656.

29. 18.032 + .40064 + 9.3 + 6.2056 + .5.

30. 37.39 + 2.6488 + 300.4 + 92.038 + 77.00005.

IMPORTANT PRINCIPLES OF COMMON AND DECIMAL FRACTIONS

72. Oral Exercises.

We have learned that an example in division may be expressed in the form of a fraction. For example, 8 ÷ 2 may be written as $\frac{8}{2}$, in which the numerator (8) is the dividend and the denominator (2) is the divisor. Every fraction is really an example in division.

1. By division, find the value of each of the following: $\frac{16}{4}$, $\frac{30}{5}$, $\frac{66}{11}$, $\frac{39}{3}$, $\frac{18}{6}$.

2. In the expression $\frac{16}{4}$, which number is the dividend? Which is the divisor? Multiply both dividend and divisor by 2. What is the result?

3. Find, by division, the value of $\frac{32}{8}$.

4. In Ex. 2, did we change the value of the expression $\frac{16}{4}$ when we multiplied both dividend and divisor by 2?

5. Multiply both dividend and divisor by 2: $\frac{20}{5}$, $\frac{24}{3}$.

When we multiply both dividend and divisor by the same number, we do not change the value of the quotient.

Likewise, *we may multiply both numerator and denominator of a fraction by the same number without changing the value of the fraction.*

6. Multiply both numerator and denominator by 3: $\frac{1}{4}$, $\frac{2}{3}$, $\frac{1}{5}$. Is the value of the fraction changed?

7. The decimal .4 = .40, because in changing .4 to .40 we have multiplied both numerator (4) and denominator (10) by 10.

You will notice that when we annex a naught at the *right* of a decimal, we do not change the value of the decimal.

8. The decimal .7 = .700. Why?

We do not change the value of a decimal when we annex two naughts at the *right.*

73. Exercises.

1. Divide both numerator and denominator of the fraction $\frac{4}{8}$ by 4.

The result is $\frac{1}{2}$, which is equal to $\frac{4}{8}$.

Dividing by 3, $\frac{3}{9} = \frac{1}{3}$.
Dividing by 4, $\frac{4}{12} = \frac{1}{3}$.
Dividing by 8, $\frac{8}{16} = \frac{1}{2}$.

Therefore, *we may divide both numerator and denominator*, or both dividend and divisor, *by the same number without changing the value of the fraction.*

Prove this statement by selecting five other fractions and dividing.

2. The decimal .50 = .5 because $\frac{50}{100} = \frac{5}{10}$.

You will notice that when we cross off a naught from the *right* of a decimal we do not change the value of the decimal.

3. Change the following to equal decimals of simpler form:

.30 .750 .60 .230 .430 .70 .850 .20

4. The decimal .300 = .3. Why?

We may cross off two naughts from the *right* of a decimal without changing its value. The same is true of three or more naughts.

5. Change the following to equal decimals of simpler form:

.200 .300 .700 .500 .800

We may annex or cross off naughts at the right of a decimal without changing the value of the decimal.

For this reason, we may annex as many naughts as are needed, when we reduce a common fraction to a decimal. (Read again the rule for reducing a common fraction to a decimal on page 37.)

SUBTRACTION OF DECIMALS

74. Written Exercises.

1. The snowfall during January and February was 22.32 inches. If 9.256 inches of snow fell in February, what was the January fall?

$$\begin{array}{r} 22.32 \\ -\ \ 9.256 \\ \hline 13.064 \end{array} \quad \textit{Ans.}$$

Write the numbers, placing tenths under tenths, hundredths under hundredths, thousandths under thousandths, and decimal point under decimal point. Then subtract.

2. From 27.005 subtract 19.7.

$$\begin{array}{r} 27.005 \\ -\ 19.7 \\ \hline 7.305 \end{array} \quad \textit{Ans.}$$

3. From 86.28 subtract 77.48.

$$\begin{array}{r} 86.28 \\ -\ 77.48 \\ \hline 8.8\cancel{0} \end{array} \quad \textit{Ans.}$$

In the product, cross off all naughts at the right of the decimal.

Subtract:

4. 16.075 − 8.326
5. 38.05 − 17.035
6. 9 − 4.08
7. 27.035 − 17.74
8. 13.025 − 6
9. 10.01 − 9.752
10. 25 − .725
11. 34.125 − 17.875
12. 16 − .01
13. 35.5 − 12.675
14. From 603.025 subtract 28.9.
15. Take seven thousandths from seven thousand.
16. 60.06 − 7.055 = ?
17. 43.062 − 42.959 = ?
18. From one hundred subtract one hundredth.
19. 3.025 − 2.9 = ?
20. 250.0325 − 239.136 = ?

21. 2.002 − 1.0356 = ?

22. From thirty and three thousandths subtract thirty-three thousandths.

23. 10.01 − 9.009 = ?

Subtract:

24. 100 − .0001
25. 72.5 − 8.6304
26. 3.503 − 2.70682
27. 30 − .00003
28. 1000 − .001
29. 13.04 − 13.004
30. 1.0075 − .9
31. 10.01 − 9.00001
32. .23475 − .22497
33. 1−.00001

75. Written Problems.

1. The four sides of a field measure as follows: 305.2 yd., 264.035 yd., 256 yd., and 36.09 yd. What is the distance around the field?

2. A walking club walked 13.65 miles on Monday, 17.3 miles on Tuesday, and 19.04 miles on Wednesday. How far did the members of the club walk in the three days?

3. How much farther did the members of the club (Ex. 3) walk on Wednesday than on Tuesday?

4. The French measure of distance is the meter. It is 39.37 inches long. How much longer is the meter than the yard?

5. The 100-meter race is 109.3 yd. long. If a man has run 93.38 yd., how many more yards must he run to finish the race?

6. Three bags of potatoes contain the following amounts: 3.165 pk., 2.8 pk., and 4.09 pk. How many pecks are there in all three bags?

7. How many more pecks are there in the third bag (Ex. 6) than in the first?

8. From a bin containing 80.5 qt. of oats, there were taken at different times 20.625 qt., 13.25 qt., and 7.7 qt. How many quarts were left?

9. $1 - .032 + 8.07 = ?$

10. $10 + 9.95 - 17.965 = ?$

MULTIPLYING A DECIMAL BY AN INTEGER

76. Written Exercises.

Multiply 3.26 by 6.

$$\begin{array}{r} 3.26 \\ \times \quad 6 \\ \hline 19.56 \end{array}$$ *Ans.*

Multiply as in whole numbers. Point off as many places in the product as there are decimal places in the multiplicand.

Find products:

1. $.45 \times 7$
2. 2.56×18
3. 4.35×6
4. 2.05×8
5. 3.256×4
6. 62.5×13
7. 1.708×12
8. 2.056×14
9. 32.05×9
10. 18.004×3
11. $.006 \times 24$
12. 1.007×5
13. $.625 \times 3$
14. 2.05×17
15. 32.8×24
16. 17.05×13
17. 6.004×5
18. 14.02×25
19. 6.045×8
20. 2.009×5
21. $.060 \times 32$
22. 2.625×4
23. 18.375×6
24. 20.04×25
25. 16.75×30
26. $.875 \times 8$
27. $.016 \times 50$
28. $.005 \times 8$
29. $.175 \times 6$
30. 3.025×16

77. Written Exercises.

Compare the multiplicand and the product in each of these examples:

$.24 \times 10 = 2.40 = 2.4.$
$.385 \times 10 = 3.850 = 3.85.$
$.03 \times 10 = .30 = .3.$

What has been done with the decimal point in the multiplicand?

What is the shortest way of multiplying these decimals by 10?

To multiply a decimal by 10, we *move the decimal point one place to the right.*

Write the answers obtained by multiplying each of the following decimals by 10:

1. .28
2. .05
3. 12.05
4. 30.065
5. .362
6. .045
7. .003
8. 16.05
9. .35
10. .007
11. .8
12. 48.2
13. .032
14. 2.32
15. 10.03
16. 1.005
17. .604
18. 30.6
19. 7.007
20. .08
21. 2.5
22. .5
23. .165
24. 3.145
25. 6.2

78. Written Exercises.

Compare the multiplicand and the product in each of the following examples:

$$.69 \times 100 = 69.00 = 69.$$
$$.365 \times 100 = 3.6500 = 3.65.$$
$$.046 \times 100 = 4.600 = 4.6.$$
$$.077 \times 100 = 7.700 = 7.7.$$
$$5.708 \times 100 = 570.800 = 570.8.$$

What has been done with the decimal point in each multiplicand?

What is the shortest way of multiplying these decimals by 100?

Write the answers obtained by multiplying each of the following decimals by 100:

1. .75
2. .05
3. 3.4
4. 74.06
5. .2
6. .288
7. .006
8. 75.6
9. .001
10. 191.5
11. .03
12. 2.39
13. .017
14. 2.576
15. 31.005
16. .075
17. 23.075
18. 2.007
19. 12.008
20. .107
21. .615
22. 17.12
23. .09
24. 16.17
25. 260.017

MULTIPLYING AN INTEGER BY A DECIMAL

79. Written Exercises.

1. Multiply 712 by .6.

$$\begin{array}{r} 712 \\ \times\quad .6 \\ \hline 427.2 \end{array}\ \textit{Ans.}$$

Multiply as in whole numbers. Point off as many places in the product as there are decimal places in the multiplier.

2. Multiply 275 by .26.

$$\begin{array}{r} 275 \\ .26 \\ \hline 1650 \\ 550 \\ \hline 71.5\cancel{0} \end{array}\ \textit{Ans.}$$

Multiply and point off as in Ex. 1. Cross off the naught after the 5 in the product.

3. Multiply 250 by 1.06.

$$\begin{array}{r} 250 \\ 1.06 \\ \hline 1500 \\ 2500 \\ \hline 265.\cancel{0}\cancel{0} \end{array}\ \textit{Ans.}$$

The multiplier here is a mixed decimal.
Multiply and point off as in Ex. 1.
Cross off the two naughts after the 5 in the product.

Multiply the following:

4. 432×.7
5. 405×.25
6. 265×.8
7. 336×.05
8. 680×.025
9. 248×1.03
10. 675×.008
11. 246×.112
12. 625×.004
13. 374×1.005
14. 256×.125
15. 108×3.75
16. 240×.045
17. 675×1.016
18. 250×4.08
19. 216×.015
20. 750×8.08
21. 268×.035
22. 175×1.65
23. 320×6.25
24. 728×.125
25. 800×7.05
26. 168×2.075
27. 255×.004
28. 950×1.024
29. 675×.006
30. 288×.025
31. 385×1.05
32. 676×3.004
33. 9,750×.08
34. 1,225×.002
35. 240×2.005

80. Written Exercises.

What is .6 of 256?

In decimals ".6 of" means that we are to multiply by .6, just as in common fractions "$\frac{6}{10}$ of" means that we are to multiply by $\frac{6}{10}$.

$$\begin{array}{r} 256 \\ \times \quad .6 \\ \hline 153.6 \end{array}$$ *Ans.*

Find:

1. .55 of 360
2. .8 of 235
3. .04 of 325
4. .05 of 248
5. .002 of 2,675
6. .025 of $528
7. .03 of $775
8. .212 of $425
9. .035 of $680
10. .07 of $8,250
11. .08 of $7,350
12. .005 of $1,648

81. Written Problems.

1. Mr. Elbert owns 140 acres of land. His neighbor, Mr. Calkins, owns 2.05 as many acres. How many acres does Mr. Calkins own?

2. Three loads of coal contain the following amounts: 2.08 tons, 4.255 tons, and 3.9 tons. How many tons are there in the three loads?

3. Jacob's father earns a salary of $2,650 a year. Benjamin's father earns .76 as much. How much does Benjamin's father earn?

4. At 85 cents a bushel, how much would 24 bushels of wheat cost?

5. A rectangular field is 20.66 rods long and 16 rods wide. How many square rods are there in the area of the field?

6. How many rods of fence would it take to surround the field in Ex. 5?

7. How much would the fence (Ex. 6) cost at $3 a rod?

8. If the quotient is .725 and the divisor is 240, what is the dividend?

9. If the minuend is 10 and the remainder is 3.004, what is the subtrahend?

10. If the subtrahend is 4.076 and the remainder is 19.76, what is the minuend?

11. How many yards are there in .025 of a mile? (1,760 yards = 1 mile.)

12. If a barrel of apples contains 2.35 bushels, how many bushels are there in 56 barrels?

DENOMINATE UNITS; FRACTIONAL PARTS OF A DOLLAR

82. Written Exercises.

1. In a certain room there are 8 windowpanes. Each pane is $2\frac{1}{2}$ ft. by $3\frac{1}{4}$ ft. How many square feet of window glass are there in that room?

2. Each windowpane in a classroom is 3 ft. 2 in. high and 2 ft. wide. If there are 4 panes of that size, how many square feet of glass are there in the windowpanes of this room?

3. How many square feet are there in a carpet rug 16 ft. 8 in. by 18 ft. 11 in.? (First change the inches to fractional parts of a foot.)

4. A party of boys gathered $1\frac{1}{4}$ bu. of chestnuts. They sold $\frac{5}{8}$ of the nuts for $.08 a pint and the remainder for $.15 a quart. How much did they receive for all the chestnuts?

5. A grocer bought a 12-gallon can of milk for $3. How much did he make by selling $\frac{2}{3}$ of it for $.05 a pint and the remainder for $.09 a quart?

6. Find the cost of laundering $5\frac{1}{3}$ dozen collars at $.02 apiece.

12 dozen or 144 things = 1 gross.

7. A button manufacturer had 2 gross of buttons displayed on cards. How many cards were there if each card held $\frac{3}{4}$ of a dozen buttons?

8. At the rate of 2 quarts for \$.25, what would 3 pecks of strawberries cost?

9. The floor of a classroom is 18 ft. by 22 ft. Draw a plan of this floor, allowing $\frac{1}{4}$ of an inch for each foot. What would be the length and breadth of your drawing? Find the cost of a hardwood floor for the room at \$.16$\frac{2}{3}$ a square foot.

10. At \$.35 a dozen, what will a box of 391 oranges cost?

83. Oral Exercises.

1. Memorize the following:

50¢ = $\frac{1}{2}$ of a dollar
25¢ = $\frac{1}{4}$ of a dollar
75¢ = $\frac{3}{4}$ of a dollar
12$\frac{1}{2}$¢ = $\frac{1}{8}$ of a dollar

33$\frac{1}{3}$¢ = $\frac{1}{3}$ of a dollar
66$\frac{2}{3}$¢ = $\frac{2}{3}$ of a dollar
16$\frac{2}{3}$¢ = $\frac{1}{6}$ of a dollar
20¢ = $\frac{1}{5}$ of a dollar

2. Type Problem. What is the cost of 31 yards of cloth at 50 cents a yard?

31 yards at \$1 a yard cost \$31.
\$31 × $\frac{1}{2}$ = \$15$\frac{1}{2}$ = \$15.50. *Ans.*

3. Find the cost of

25 doz. eggs at 25¢
35 lb. of tea at 50¢
18 yd. of muslin at 12$\frac{1}{2}$¢
15 gal. of sirup at 33$\frac{1}{3}$¢
9 qt. of pears at 16$\frac{2}{3}$¢
27 boxes of cakes at 50¢
60 doz. blank books at 66$\frac{2}{3}$¢
36 lb. of coffee at 33$\frac{1}{3}$¢

16 yd. of silk at 75¢
180 lb. of cheese at 66$\frac{2}{3}$¢
14 hammers at 20¢
32 bu. of wheat at 75¢
72 ft. of stone fence at 25¢
15 gal. of molasses at 16$\frac{2}{3}$¢
84 yd. of cloth at 75¢
24 lb. of nails at 20¢

84. Written Exercises.

Many articles are sold by the dozen, by the gross, by the hundred, or by the thousand, instead of by the single article.

1. Find the cost of 54 eggs at 30¢ a dozen.

$\frac{54}{12} \times \$.30 = 4\frac{1}{2} \times \$.30 = \$1.35.$ *Ans.*

2. What is the cost of 1,200 cubic feet of gas at 8 cents a hundred cubic feet?

Point off two places and multiply.

$12.00 \times \$.08 = \$.96.$ *Ans.*

3. Find the cost of 4,200 feet of lumber at $58 a thousand feet.

Point off three places and multiply.

$4.2 \times \$58 = \$243.6$ or $243.60. *Ans.*

4. Find the cost of 1700 oysters at $1.15 a hundred.

5. What would be the cost of 2,475 envelopes at $7.00 a thousand?

6. If the freight rate for a certain distance is 24¢ per hundred pounds, what would it cost to send a load weighing 1600 pounds?

7. The ice man delivered at our house during May 1,300 pounds of ice. What did it cost at 40¢ a hundred?

8. What would 6,200 laths cost at 75¢ per hundred?

9. What would be the cost of 1,875 feet of pine at $64 per hundred?

10. What would be charged for 18,000 bricks at $9.25 per thousand?

11. A wholesale dealer in butter and eggs bought 15 gross of egg boxes for $345.60. What was the cost of each box?

12. My gas bill for November read as follows: "Present state of meter 11,200 cubic feet. Previous state of meter 6,800 cubic feet." How many cubic feet of gas did I use during November? What is my gas bill, if gas sells at the rate of 8¢ per hundred?

13. A mill planes 19,000 feet of boards for our firm. If they are billed at the rate of 96¢ per thousand feet, what is the amount of our bill?

14. What would 100 eggs cost at 25 cents a dozen?

15. The cost of a gross of pens is $4.32. At that rate, what would one pen cost?

BILLS

85. Written Exercises.

1. You are acting as clerk for the baker near your home. Make out a bill to some neighbor for goods delivered during the month:

Rolls each day at 5¢ (enter these in one item without date).
1 loaf bread each day at 5¢.
2 apple pies at 20¢; 1 large mince pie, 35¢; 1 jelly roll, 35¢.
Receipt the bill.

2. Your newsdealer and stationer leaves at your house a bill for the month for 26 daily papers (put in one item) and 8 Sunday papers, 2 boxes of writing paper at 38¢, 4 *Saturday Evening Posts,* and 1 *Harper's Monthly Magazine.* Find the prices; make and receipt the bill.

3. Mrs. James Whitlock of 129 Washington Place, Boston, bought of John Wanamaker, Broadway and 9th Street, New York, the following goods on the dates specified:

Oct. 7, 1916: $2\frac{3}{4}$ yd. flannel at $1.40 a yard; $17\frac{1}{2}$ yd. embroidery at $.16 a yard; 8 buttons at $2.70 a dozen. Oct. 16: $9\frac{1}{8}$ yd. linen at $1.44 a yard; 1 pair gloves, $1.50; 15 yd. ribbon at $.27 a yard.

The bill was made out and sent to Mrs. Whitlock Oct. 31, 1916. She paid the bill to a clerk, Sam Allen, who receipted the bill.

Make out and receipt the bill.

4. Make out a bill for 12 different items purchased during the month at the hardware store. Get from the dealer the names and prices of his goods before you make out the bill.

86. Written Problems.

1. Two boys started to walk from New York to New Haven, a distance of 85 miles by road. The first day they walked $23\frac{1}{4}$ miles, and the second day they walked $7\frac{1}{2}$ miles less than on the first day. How far were they then from New Haven?

2. A grocer had two cheeses weighing $16\frac{1}{4}$ lb. and $11\frac{1}{8}$ lb. He sold $9\frac{1}{2}$ lb. from the first cheese and $7\frac{3}{4}$ lb. from the second. How many pounds were left in each? How many pounds were left in both?

3. From a piece of cotton cloth containing $31\frac{1}{8}$ yd. I cut three pieces, each measuring $7\frac{1}{2}$ yd. How many yards were left?

4. An estate of $5,850 was divided among four sons, a daughter, and a mother. Each son received .13, the daughter received .18, and the mother received .3 of the amount. Find what each received.

5. The distance from New York to Albany is 143 miles. A train, starting from New York, was derailed after going $\frac{3}{8}$ of the distance. How many miles from Albany was the train when the accident happened?

6. The "Fast Mail" makes the trip from New York to Buffalo in $10\frac{1}{4}$ hours. The distance is 439 miles. What is the average speed per hour?

7. A messenger boy had to deliver four packages that weighed as follows: $5\frac{7}{8}$ lb., $3\frac{2}{3}$ lb., $11\frac{1}{4}$ lb., and $2\frac{1}{2}$ lb. How much did they weigh all together?

8. A grocer bought a box containing 54 grapefruit for $3. He sold them at the rate of 3 for a quarter. How much did he make?

9. The distance from Frank's home to the school is $\frac{3}{16}$ miles. He goes home for luncheon every day. How far must he walk each day in going to and from school? What does this amount to in a month of twenty school days?

10. We burn $1\frac{2}{3}$ tons of coal a month. How long will $7\frac{1}{2}$ tons last? How much will this supply of coal cost at $6.80 a ton?

11. A farmer sold .26 of his farm of 375 acres for $2,340. At this rate, what was the price per acre?

12. A dealer in second-hand books bought a lot of books as follows: 82 books at $7\frac{1}{2}$¢ each, 7 at 9¢ each, 15 at 12¢ each, and 13 at 15¢ each. What was the average price paid per book?

To get the average, we divide the total number of dollars by the total number of books.

13. A man earning $14 per week divides his money as follows: .45 for board; .25 for clothes; .15 for the bank; and the remainder for amusement. How much money does he allow for each?

14. If $3\frac{7}{8}$ yd. of cloth are used to cut a certain coat, how many coats can a tailor cut from $96\frac{7}{8}$ yd. of the cloth?

15. A man had $2,296 in a savings bank. He took $\frac{3}{8}$ of it out, and divided it equally among his 7 sons. How much did each son receive?

87. Written Problems.

KEEPING STORE

Mildred's father keeps a dry-goods store. He left Mildred in charge of the cash register on Saturday. He left two dollars in change in the drawer of the register.

1. Mrs. Black bought 5 yd. of calico at \$.12½ a yard, 2¾ yd. of lace at \$.25 a yard, and a pair of gloves for \$.48. She gave the clerk a two-dollar bill. How much change should she receive?

2. Mrs. Yates bought 8 buttons at \$.45 a dozen. What change should Mildred give her from a half dollar?

3. Miss Allen returned 5½ yd. of ribbon at \$.18 and bought 4¾ yd. of wider ribbon at \$.24 a yard. How much more should she pay?

4. Mr. Cohen purchased ½ doz. collars at the rate of two for a quarter, and three handkerchiefs at the same rate. He gave the clerk a dollar bill and a quarter. How much change should he receive?

5. The tailor bought 9 pieces of braid at \$.75 a dozen and 20 buttons at \$.15 a dozen. How much did he pay?

6. How much did Mildred have in the cash drawer after her five customers had left?

7. What fraction of this amount did Mildred take in?

8. On the previous day the receipts were \$6.30. The receipts on Saturday were what fractional part of the receipts on Friday?

Wages and Expenses

9. Mary Morris works in a department store and receives \$8 a week. Her sister, Lizzie, who lives in a family as general worker, receives \$4½ a week and her board and washing. Mary pays \$4.80 a week for her board and washing and \$.10 each week day for carfare. At the end of the week, which sister has the more to spend and how much more?

10. How much more spending money does Lizzie have in a year (52 weeks) than Mary?

11. Their cousin works in a garment factory, sewing seams at the rate of $.09 a dozen garments. She can finish an average of 15 dozen a day. How much does she earn in a week of 6 days? Her expenses are the same as Mary's. What fractional part of her wages does she have as spending money?

12. How much money does the cousin have for spending during the year (52 weeks)?

13. Which girl has the most spending money in a year? How much more does she have than each of the others?

14. Mary's younger brother works as an errand boy and earns $\frac{3}{5}$ as much as Mary. How much does he earn in a year of 52 weeks?

THIRD QUARTER

COUNTING

88. Oral Exercises.

1. Beginning with 8, count by 6's to 104.
2. Beginning with 4, count by 8's to 100.
3. Beginning with 3, count by 7's to 101.
4. Beginning with 4, count by 9's to 112.

ROMAN NOTATION

89. Written Exercises.

Write the following dates in Roman numerals:

1759. Quebec was captured by the English.
1776. The battles of Long Island and Trenton were fought.
1783. The treaty of Paris was signed.
1825. The Erie Canal was opened.
1848. Gold was discovered in California.
1915. The Panama-Pacific Exposition was held in San Francisco.

ADDITION

90. Oral Exercises.

At sight, give the sums of the following numbers:

1. 82	**2.** 53	**3.** 90	**4.** 74	**5.** 95
28	19	64	39	57

6. 81
28

7. 80
57

8. 55
28

9. 94
36

10. 77
59

11. 70
33

12. 81
49

13. 83
47

14. 48
39

15. 60
48

16. 97
48

17. 76
19

18. 96
57

19. 50
29

20. 73
46

91. Written Exercises.

1. 94,327
75,986
68,437
59,587
69,785
89,586
39,784
25,869
37,453
53,975

2. 79,582
86,426
95,487
38,965
47,694
39,579
28,488
53,743
85,956
39,295

3. 85,988
78,695
89,587
68,959
37,385
92,984
16,973
59,849
63,498
76,998

4. 67,958
54,397
98,506
73,985
69,397
54,876
37,549
28,399
14,987
37,056

5. 92,758
79,864
84,975
69,597
38,688
58,976
48,396
57,596
93,295
87,145

6. 95,467
68,743
57,589
47,638
57,957
97,365
19,494
54,869
35,467
94,325

7. $ 87.96
59.85
863.29
9.17
968.58
93.97
687.58
408.35
97.63
576.59

8. $568.92
476.57
95.78
809.08
537.64
648.85
395.93
287.58
596.97
308.65

9. $498.97
69.59
587.65
348.58
836.72
475.46
582.85
654.29
948.73
87.65

10. 378,963
89,795
6,879
517,936
97,657
8,543
75,938
95
8,576
937,954

11. 693
57,809
8,937
869,598
94,305
719
19,854
8,875
86,967
9,584

12. 8,963
87,497
509,879
54,796
693,985
387,659
68,897
279,468
84,785
608,957

13. 9,763
18,957
567,895
8,609
46,586
5,974
938,768
57,487
568,976
19,547

14. 46,892
795,875
589,768
48,098
674,956
8,587
289,685
36,494
493,879
8,768

15. 748,869
96,598
7,957
589,685
78,896
407,959
59,787
398,695
5,978
89,569

16. Add:
Nine thousand six,
Sixty million nine hundred eighty thousand seventy-four,
Nine million nine thousand nine hundred eight,
Fifty-seven thousand ninety-seven,
Eight hundred seventy-eight thousand five hundred sixty-nine,
Seventeen million ninety-four thousand eight hundred eighty-five,
Seven hundred eight thousand nine hundred fifty.

17. Add:
Three hundred eight dollars and nine cents,
Ninety-seven dollars and sixty-five cents,
Five thousand eighty dollars and ninety cents,
Nine thousand seven hundred sixty-five dollars and eighty-seven cents,
Eight hundred nineteen dollars and thirteen cents,
Four thousand six hundred seventy-eight dollars and fifty-nine cents,
Five hundred ninety-one dollars and sixty cents.

18. Add:
Fourteen thousand six hundred seventy,
Fifty-two thousand four hundred twenty-six,
Eight hundred ninety thousand five hundred sixty-one,
Six hundred forty-seven thousand fifty-four,
Nineteen thousand eighteen,
Twenty-eight thousand four hundred forty,
One million six hundred thousand nine hundred seventy-six,
Seventy-five thousand five hundred thirty-eight,
Three million three hundred eighty-six thousand seven,
Nine thousand two hundred thirty-four.

SUBTRACTION

92. Oral Exercises.

At sight, find the amount of purchase in each of the following:

	Amount of Purchase	Amount Given to Storekeeper	Change		Amount of Purchase	Amount Given to Storekeeper	Change
1.		$ .75	$ .16	14.		$ 2.00	$ .57
2.		1.00	.27	15.		5.00	3.62
3.		1.25	.17	16.		10.00	8.32
4.		2.00	.63	17.		1.00	.63
5.		5.00	1.19	18.		.50	.29
6.		.75	.08	19.		20.00	4.13
7.		10.00	1.78	20.		10.00	6.83
8.		20.00	7.63	21.		5.00	2.55
9.		1.00	.46	22.		1.00	.34
10.		10.00	5.76	23.		20.00	3.87
11.		5.00	1.34	24.		10.00	2.46
12.		20.00	2.18	25.		5.00	2.37
13.		5.00	3.23	26.		20.00	5.36

93. Written Exercises.

Subtract:

1. 4,603,227
− 3,584,689

2. 2,604,327
− 1,958,238

3. 8,072,635
− 2,957,847

4. 7,329,005
− 2,789,567

5. 8,432,074
− 5,739,086

6. 3,284,736
− 1,019,857

7. 5,358,203
− 1,987,957

8. 9,304,658
− 1,976,879

9. 4,736,021
− 2,585,297

10. 6,025,317
− 3,765,938

11. 1,687,004
− 963,487

12. 5,304,637
− 2,957,868

13. $\begin{array}{r} 7{,}240{,}307 \\ -\ 6{,}357{,}208 \\ \hline \end{array}$ **14.** $\begin{array}{r} 1{,}432{,}005 \\ -\ \ \ 872{,}006 \\ \hline \end{array}$ **15.** $\begin{array}{r} 9{,}486{,}203 \\ -\ 8{,}759{,}204 \\ \hline \end{array}$

16. How much more is 3,216,941 than 1,689,957?

17. How much greater than 1,634,205 is 3,524,101?

18. Find the difference between 5,692,327 and 6,100,420.

19. How much less than 9,862,121 is 4,908,362?

20. When the minuend is 8,712,523 and the subtrahend is 5,863,749, what is the remainder?

MULTIPLICATION

94. Oral Exercises.

1. At 8¢ each, find the cost of

9 qt. of milk
12 yd. of ribbon
7 loaves of bread
15 lb. of crackers
8 cakes of soap
6 boxes of berries
25 notebooks
20 rubber balls
5 rulers
14 roses

2. At 12¢ each, find the cost of

6 small dolls
9 handkerchiefs
12 yd. of lace
8 pencil boxes
4 lb. of candy
7 cakes
5 melons
11 rubber balls
10 ink erasers
3 knives

3. At $.09 each, find the cost of

8 rolls of crêpe paper
7 tubes of paste
9 qt. of nuts
4 lb. of rice
6 bottles of ink
12 picture books
5 qt. of milk
11 boxes of crackers
3 spools of silk
10 thimbles

95. Written Exercises.

1. 96,873 × 58
2. 64,978 × 930
3. 28,068 × 907
4. 87,609 × 604
5. 79,086 × 67
6. 53,487 × 680
7. 37,958 × 806
8. 59,584 × 708
9. 85,607 × 94
10. 49,658 × 750
11. 56,087 × 405
12. 67,908 × 509

DIVISION

96. Oral Exercises.

At sight, divide:

1. 8)568
2. 12)1,080
3. 9)9,108
4. 7)4,270
5. 9)729
6. 11)242
7. 7)7,490
8. 6)4,206
9. 5)3,030
10. 8)872
11. 12)2,460
12. 9)9,549
13. 6)486
14. 5)1,080
15. 8)8,400
16. 5)3,540
17. 4)456
18. 6)7,260
19. 11)3,333
20. 8)2,408

97. Written Exercises.

1. 207)632,075
2. 347)491,632
3. 932)367,008
4. 320)195,386
5. 408)587,089
6. 863)852,034
7. 584)290,067
8. 680)387,009
9. 706)760,534
10. 475)935,460
11. 639)475,003
12. 460)170,064

98. Oral Exercises.

Give answers at sight:

$$\begin{array}{rl} & \\ & \\ \textbf{1.}\ \frac{2}{9}\text{ of} & \\ & \\ \textbf{2.}\ \frac{5}{9}\text{ of} & \\ & \\ & \\ \textbf{3.}\ \frac{7}{9}\text{ of} & \\ & \\ \textbf{4.}\ \frac{8}{9}\text{ of} & \\ & \\ & \end{array}\left\{\begin{array}{r} 18\\ 45\\ 1\\ 72\\ 108\\ 36\\ 54\\ 27\\ 63\\ 81\\ 9\\ 90 \end{array}\right. \qquad \begin{array}{rl} & \\ & \\ \textbf{5.}\ \frac{3}{7}\text{ of} & \\ & \\ \textbf{6.}\ \frac{4}{7}\text{ of} & \\ & \\ & \\ \textbf{7.}\ \frac{5}{7}\text{ of} & \\ & \\ \textbf{8.}\ \frac{6}{7}\text{ of} & \\ & \\ & \end{array}\left\{\begin{array}{r} 21\\ 49\\ 63\\ 84\\ 1\\ 7\\ 28\\ 42\\ 56\\ 35\\ 14\\ 70 \end{array}\right.$$

APPROXIMATE ANSWERS

99. Exercises.

In the following examples, first give approximate answers and then test the accuracy of the answers with pencil and paper.

1. The area of New York State is 49,204 square miles; that of Texas is 265,896 square miles. How many times greater in area is Texas than New York? What is the difference in area of these two states?

2. What will a dealer have to pay for 157 pairs of shoes at $2.10 a pair?

3. Mary bought three remnants of ribbon measuring $5\frac{3}{4}$ yd., $1\frac{1}{8}$ yd., and $3\frac{1}{2}$ yd. respectively. How much did the three pieces together measure?

4. Find the cost of 29 lb. 14 oz. of candy at $.50 a pound.

5. What will 8 barrels of flour weigh if 1 barrel weighs 196 pounds?

In the following examples give the approximate answers before using pencil and paper.

6. $\begin{array}{r}5{,}004\\7{,}985\\3{,}016\\\underline{2{,}000}\end{array}$

7. $\begin{array}{r}1{,}972\\4{,}039\\987\\\underline{4{,}899}\end{array}$

8. $\begin{array}{r}3{,}993\\1{,}078\\8{,}007\\\underline{5{,}989}\end{array}$

9. $\begin{array}{r}968\\6{,}015\\897\\\underline{2{,}978}\end{array}$

10. $\begin{array}{r}5{,}904\\\underline{-\ 1{,}017}\end{array}$

11. $\begin{array}{r}8{,}101\\\underline{-\ 987}\end{array}$

12. $\begin{array}{r}14{,}972\\\underline{-\ 8{,}958}\end{array}$

13. $\begin{array}{r}31{,}004\\\underline{-\ 18{,}978}\end{array}$

14. $\begin{array}{r}4{,}968\\\underline{\times\ 39\frac{3}{4}}\end{array}$

15. $\begin{array}{r}2{,}007\\\underline{\times\ 52\frac{2}{3}}\end{array}$

16. $\begin{array}{r}1{,}971\\\underline{\times\ 19\frac{7}{8}}\end{array}$

17. $\begin{array}{r}99{,}894\\\underline{\times\ 61\frac{5}{6}}\end{array}$

18. $3{,}017 \div 97$

19. $495 \div 19\frac{3}{4}$

20. $\dfrac{1605}{31\frac{4}{5}}$

21. $\dfrac{899\frac{3}{4}}{44\frac{7}{8}}$

SHORT METHODS; MULTIPLYING BY $12\frac{1}{2}$

100. Written Exercises.

What part of 100 is $12\frac{1}{2}$?

What is the short method of multiplying a number by $12\frac{1}{2}$?

Multiply 16 by $12\frac{1}{2}$.

$$16 \times 12\tfrac{1}{2} = 1600 \div 8 = 200. \quad \textit{Ans.}$$

Write answers to the following:

1. $24 \times 12\frac{1}{2}$

2. $48 \times 12\frac{1}{2}$

3. $32 \times 12\frac{1}{2}$

4. $56 \times 12\frac{1}{2}$

5. $64 \times 12\frac{1}{2}$

6. $72 \times 12\frac{1}{2}$

7. $88 \times 12\frac{1}{2}$

8. $248 \times 12\frac{1}{2}$

9. $320 \times 12\frac{1}{2}$

10. $408 \times 12\frac{1}{2}$

11. $640 \times 12\frac{1}{2}$

12. $144 \times 12\frac{1}{2}$

13. $488 \times 12\frac{1}{2}$

14. $168 \times 12\frac{1}{2}$

15. $248 \times 12\frac{1}{2}$

PARENTHESES

101. Written Exercises.

All numbers in a parenthesis must be regarded as one quantity.

1. $(9 + 5) \times (6 - 3) = ?$

Before we multiply, we must find the value of $9 + 5$ and of $6 - 3$.

$$9 + 5 = 14. \qquad 6 - 3 = 3.$$
$$14 \times 3 = 42. \quad \textit{Ans.}$$

2. Find the value of $(27 \div 3) - (2 \times 4)$.

$$27 \div 3 = 9. \qquad 2 \times 4 = 8.$$
$$9 - 8 = 1. \quad \textit{Ans.}$$

Find the value of the following:

3. $(108 \div 12) \times (12 - 8)$.
4. $(23 + 5 - 16) \div (20 - 18)$.
5. $75 - (36 + 16 - 12)$.
6. $(336 - 162) \div (87 \div 3)$.
7. $(25 \div 5) + (86 - 72) - (7\frac{1}{2} \times 2)$.
8. $7 \times (\frac{2}{5}$ of $15) \div (18 \div 3) + (12 \div 2\frac{2}{5})$.

ADDITION AND SUBTRACTION OF FRACTIONS

102. Written Exercises.

1. $80\frac{2}{3}$	**2.** $75\frac{5}{7}$	**3.** $607\frac{3}{5}$	**4.** $863\frac{7}{11}$
$17\frac{5}{6}$	$86\frac{2}{3}$	$59\frac{11}{15}$	$97\frac{1}{6}$
$93\frac{3}{4}$	$537\frac{11}{21}$	$338\frac{1}{2}$	$534\frac{2}{3}$
$58\frac{7}{9}$	$94\frac{7}{15}$	$547\frac{2}{3}$	$88\frac{9}{22}$
$509\frac{1}{2}$	$359\frac{1}{42}$	$95\frac{7}{8}$	$459\frac{3}{4}$

5. $\frac{5}{7} + \frac{3}{5} + \frac{3}{4} + \frac{9}{10} + \frac{17}{20}$

6. $\frac{2}{3} + \frac{5}{6} + \frac{7}{11} + \frac{5}{12} + \frac{3}{4}$

7. $\frac{5}{21} + \frac{7}{12} + \frac{5}{6} + \frac{9}{14} + \frac{2}{3}$

8. $\frac{5}{28} + \frac{11}{35} + \frac{7}{8} + \frac{9}{10} + \frac{3}{4}$

9. $\frac{2}{3} + \frac{3}{5} + \frac{3}{4} + \frac{11}{15} + \frac{19}{20}$

10. $\frac{7}{9} + \frac{5}{6} + \frac{11}{12} + \frac{7}{18} + \frac{3}{4}$

103. Written Exercises.

1. $\begin{array}{r} 97\frac{2}{13} \\ -\ 19\frac{2}{3} \\ \hline \end{array}$

2. $\begin{array}{r} 51\frac{1}{8} \\ -\ 18\frac{5}{28} \\ \hline \end{array}$

3. $\begin{array}{r} 302\frac{1}{4} \\ -\ 297\frac{5}{18} \\ \hline \end{array}$

4. $\begin{array}{r} 535\frac{1}{42} \\ -\ 248\frac{7}{15} \\ \hline \end{array}$

5. $\begin{array}{r} 600\frac{1}{6} \\ -\ 173\frac{9}{22} \\ \hline \end{array}$

6. $\begin{array}{r} 835\frac{7}{8} \\ -\ 576\frac{2}{3} \\ \hline \end{array}$

7. $\begin{array}{r} 544\frac{3}{5} \\ -\ 285\frac{2}{3} \\ \hline \end{array}$

8. $\begin{array}{r} 723\frac{2}{3} \\ -\ 569\frac{7}{9} \\ \hline \end{array}$

9. Find the difference between $387\frac{3}{4}$ and $483\frac{2}{3}$.

10. Subtract $508\frac{11}{16}$ from $903\frac{15}{28}$.

11. From $318\frac{2}{5}$ subtract $139\frac{3}{7}$.

12. Subtract $437\frac{5}{9}$ from $933\frac{7}{15}$.

MULTIPLICATION AND DIVISION OF FRACTIONS

104. Written Exercises.

1. $2\frac{1}{2} \times \frac{7}{8} \times 3\frac{1}{3} \times \frac{6}{15} \times 1\frac{7}{8}$

2. $\frac{1}{6} \times \frac{7}{9} \times \frac{20}{21} \times 8\frac{2}{5} \times 2\frac{1}{4}$

3. $5\frac{1}{3} \times 24 \times 1\frac{3}{5} \times \frac{15}{64} \times \frac{1}{48}$

4. $1\frac{1}{8} \times 6\frac{2}{3} \times 5\frac{3}{5} \times \frac{3}{7} \times \frac{1}{18}$

5. $\frac{4}{9} \times 3\frac{3}{8} \times 4\frac{2}{7} \times 3\frac{1}{5} \times 3\frac{1}{11}$

6. $8\frac{8}{9} \times 9\frac{3}{4} \times \frac{3}{5}$

7. $5\frac{5}{7} \times 8\frac{2}{5} \times \frac{5}{21}$

8. $216 \times 9\frac{3}{8}$

9. $98 \times 7\frac{2}{7}$

10. $368 \times 56\frac{1}{4}$

105. Written Exercises.

1. $589 \div \frac{3}{4}$

2. $896 \div \frac{7}{8}$

3. $378 \div 5\frac{2}{5}$

4. $825 \div 4\frac{1}{6}$

5. $\frac{8}{9} \div 5\frac{1}{3}$

6. $\frac{15}{32} \div 11\frac{1}{4}$

7. $57\frac{3}{4} \div \frac{3}{16}$

8. $96\frac{6}{7} \div \frac{5}{6}$

9. $\frac{11}{15} \div \frac{3}{7}$

10. $\frac{5}{16} \div \frac{35}{48}$

11. $18\frac{3}{5} \div 5\frac{1}{6}$

12. $46\frac{2}{3} \div 7\frac{1}{9}$

13. Simplify $\frac{8\frac{1}{3} \times 6\frac{3}{5}}{9\frac{1}{6} \times \frac{7}{9}}$.

14. Change to simplest form: $\frac{\frac{5}{7} \times 1\frac{2}{5}}{4\frac{2}{7}}$.

15. Reduce $\frac{\frac{2}{3} \times 1\frac{1}{4}}{3\frac{1}{4}}$ to simplest form.

PARTS OF NUMBERS

106. Oral Exercises.

TYPE PROBLEM. 3 is what part of 8?

1 is $\frac{1}{8}$ of 8.
3 is $3 \times \frac{1}{8}$ or $\frac{3}{8}$ of 8.

1. 4 is what part of 5?

2. 3 is what part of 7?

3. 8 is what part of 9?

4. 5 is what part of 11?

5. 7 is what part of 12?

6. What part of 6 is 5?

7. What part of 11 is 7?

8. What part of 15 is 11?

9. What part of 4 is 3?

10. What part of 5 is 2?

Reduce a fraction to lower terms, whenever it is possible to do so.

11. 8 is what part of 12?

$$\frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{12}}} = \frac{2}{3}.$$

12. 6 is what part of 9?

13. 9 is what part of 15?

14. 16 is what part of 20?

15. What part of 12 is 9?

16. What part of 16 is 12?

17. What part of 24 is 18?

18. 16 is what part of 24?

19. 20 is what part of 25?

20. 14 is what part of 21?

21. 18 is what part of 27?

107. Written Exercises.

1. What part of 175 is 75?
2. What part of 256 is 96?
3. What part of 320 is 256?
4. What part of 168 is 49?
5. $27 is what part of $99?
6. $63 is what part of $217?
7. $.64 is what part of $2.24?

When an example of this kind contains both dollars and cents, we must reduce both numbers to cents before proceeding.

$$\frac{64 \text{ cents}}{224 \text{ cents}} = \frac{64}{224} = \frac{2}{7}.$$

64 cents is $\frac{2}{7}$ of 224 cents.

8. What part of $16 is $3.20?
9. What part of $2.40 is $.75?
10. What fraction of $3.60 is $2.25?
11. What fraction of $8 is $.40?
12. $1.20 is what part of $15?
13. $2.25 is what fraction of $3.50?

108. Oral Problems.

1. James had 12 marbles and gave away 9. What part of his marbles did he give away?

What part of 12 is 9? $\frac{9}{12} = \frac{3}{4}$. *Ans.*

2. Oscar had 72 cents and Richard had 56 cents. What fractional part of Oscar's money did Richard have?

3. Oscar had 72 cents and gave away 32 cents. What part of his money did he give away? What part did he have left?

4. Richard had 56 cents and spent 24 cents. What part of his money was then left?

5. What fractional part of the day has elapsed at 9 A.M.? At 9 P.M.? (The day begins at midnight.)

6. What fractional part of the month of June has elapsed at the close of the 21st day of the month?

109. Written Problems.

1. A train runs from New York to Albany, a distance of 144 miles. What part of the total distance has it gone when it reaches Hudson, 112 miles from New York?

2. A grocer fails in business. He owes $256 and has only $179.20 with which to pay his debts. What part of his debts can he pay?

3. A grocer invested $2,100 in business. He made a profit of $1,750. What part of his investment was his profit?

4. Mr. Amos has a farm of 216 acres. He plants 84 acres with wheat and 102 acres with oats. What part of his farm is planted with wheat? What part with oats?

5. James bought during the week 168 newspapers. He sold only 144. What part of the whole number did he sell? What part did he have left?

6. TYPE PROBLEM. When $3\frac{1}{2}$ quarts of milk cost 28 cents, what will $4\frac{1}{2}$ quarts cost?

28 cents $\div 3\frac{1}{2} =$ 8 cents, cost of 1 qt.
8 cents $\times 4\frac{1}{2} =$ 36 cents, cost of $4\frac{1}{2}$ qt. *Ans.*

7. If $3\frac{3}{4}$ yd. of ribbon cost 45 cents, what will $8\frac{2}{3}$ yd. cost?

8. If $2\frac{1}{2}$ lb. of tea cost $1.20, what will $3\frac{1}{4}$ lb. cost?

9. If $17\frac{1}{3}$ acres produce 104 bushels of corn, how many bushels will $22\frac{4}{5}$ acres produce, at the same rate?

10. **Type Problem.** John can walk $3\frac{1}{2}$ miles in an hour. At that rate, how long will it take him to walk 14 miles?

$$14 \div 3\frac{1}{2} = 4 \text{ (hr.)}. \quad \textit{Ans.}$$

11. Sarah can walk $2\frac{1}{3}$ miles in an hour. How long will it take her to walk 14 miles?

12. At the same rate, how long would it take Sarah to walk $5\frac{3}{5}$ miles?

13. An automobile is traveling at the rate of $22\frac{2}{5}$ miles an hour. How long will it take to go $180\frac{4}{5}$ miles?

14. A cubic foot of water weighs $62\frac{1}{2}$ lb. If iron is $7\frac{3}{5}$ times as heavy as water, how much does a cubic foot of iron weigh?

15. A sheet of cardboard is $16\frac{2}{3}$ inches long and $12\frac{3}{4}$ inches wide. How many square inches are there in the area of the sheet?

16. How many inches are there in the perimeter of the sheet in Ex. 15? (*Perimeter* means the distance around the outside.)

17. A grocer bought 368 lb. of sugar at $6\frac{3}{8}$ cents a pound and sold it in 2-pound bags at 15 cents a bag. How much did he make?

18. A walking party walk at the rate of $3\frac{3}{5}$ miles an hour. How far would they walk in $2\frac{1}{3}$ hours?

19. Mr. Thomas has $21\frac{3}{8}$ acres of land. He buys $17\frac{4}{5}$ acres from Mr. Brown and $17\frac{3}{20}$ acres from Mr. Adams. How many acres has he then?

20. What is Mr. Thomas's land (Ex. 19) then worth at \$120 an acre?

21. $3\frac{5}{6}$ yd. of cloth were cut from a piece measuring $9\frac{3}{8}$ yd. How much remained?

22. What is the remainder of the cloth (Ex. 21) worth at \$1.20 a yard?

READING AND WRITING DECIMALS

110. Oral Exercises.

1. Read the following decimals:

.505
6.090
200.02
80.80
300.03
.0005
20.0020
6.07125
900.00009
75.0075
500.005
90.09
.062
8.07
.86
170.0070
.00010
16.0016
8.07525
160.0160
8.8008
30.01104
207.2075
.57326
8.0608

2. .20009
3.0505
300.03
.020507
.032020
.600606
.025016
3.028015
30.000030
14.014014
180.000009
70.007070
160.016016
90.050005
70.700707

3. At sight, multiply the following decimals by 100. Read the answers.

.6
.95025
3.8
15.2501
63.01
100.5
38.62
.007
4.07025
505.04
38.1060
5.09
25.25025
.834
30.005
1.001011
35.00572
80.80808
34.057025
9.63

4. Multiply the decimals in Ex. 3 by 1000.

111. Written Exercises.

Write the following decimals:

Sixty millionths.
Eight hundred and four millionths.
Sixty and sixty millionths.
Forty and forty ten-thousandths.
Eighty and eight hundred-thousandths.
Six hundred and six hundredths.
Four hundred and four millionths.

Twelve millionths.
Four and forty-four hundred-thousandths.
Eighty thousandths.
Eight hundred and three ten-thousandths.
Seven thousand seven millionths.
Sixty and sixty thousandths.
Eighty-nine and eighty-nine thousandths.
Four hundred-thousandths.

ADDITION AND SUBTRACTION OF DECIMALS

112. Written Exercises.

Add:

1. 78.63 + 9.007 + 35.08 + .763 + 87.09 + .806.
2. .847 + 98.09 + .0075 + 86.009 + 9.675 + 57.
3. 97.7 + 3.008 + 693.05 + 508.706 + 58.9 + .895.
4. 9.067 + 86.93 + 767.008 + 59.09 + 786.95 + 38.609.
5. .78 + 95.087 + 689.05 + 53.053 + 939.8 + 309.87.
6. .009 + 77.09 + 89.608 + 954.79 + 5.903 + 837.60.
7. 6.9 + 94.605 + 85.009 + .069 + 9.073 + 45.017.
8. .75 + 690.009 + 82.17 + 589.638 + 38.09 + 6.19.
9. .008 + 9.06 + 387.957 + 95.008 + 47.63 + .0975.
10. 57.919 + 6.09 + 305.407 + 93.58 + 983.9 + 58.509.

Subtract:

11. 9.8 − 6.583
12. 73.11 − 59.174
13. 900.9 − 576.38
14. 370.15 − 98.9
15. 855.42 − 37.684
16. 92.07 − 38.659
17. 5.62 − 3.9787
18. 625.7 − 69.59
19. 83.004 − 47.389
20. 410.73 − 279.063

MULTIPLICATION OF DECIMALS

113. Written Exercises.

1. .027 × 6
2. 3.0012 × 9
3. 7.0056 × 5
4. .20005 × 8
5. 75.004 × 7
6. 7.008 × 6
7. 17.1056 × 30
8. .3125 × 16
9. .09375 × 8
10. 4.00005 × 6
11. 57.98 × 965
12. 98.067 × 508
13. 76.008 × 935
14. 57.065 × 870
15. 85.947 × 658
16. 256 × .08
17. 312 × .005
18. 786 × 2.5
19. 224 × 5.025
20. 300 × 7.07
21. 625 × .0008
22. 1,625 × 1.04
23. 175 × .006
24. 225 × 30.04
25. 1,284 × 2.05
26. 9,576 × 8.7
27. 8,697 × .94
28. 3,805 × 5.68
29. 6,549 × .083
30. 7,984 × .907

MULTIPLYING A DECIMAL BY A DECIMAL

114. Written Exercises.

I. Multiply .1 by .1.

$$.1 \times .1 = \frac{1}{10} \times \frac{1}{10} = \frac{1}{100} = .01.$$

II. Multiply .1 by .01.

$$.1 \times .01 = \frac{1}{10} \times \frac{1}{100} = \frac{1}{1000} = .001.$$

III. Multiply .01 by .01.

$$.01 \times .01 = \frac{1}{100} \times \frac{1}{100} = \frac{1}{10000} = .0001.$$

In Ex. I, how many places are there in the multiplicand? In the multiplier? In the product?

Answer the same questions for Exs. II and III.

What rule can you make for placing the decimal point in the product of two decimals?

1. $.3 \times .7$
2. $.5 \times .6$
3. $.4 \times .8$
4. $.7 \times .7$
5. $.8 \times .2$
6. $.9 \times .5$
7. $.3 \times .6$
8. $.4 \times .9$
9. $.6 \times .6$
10. $.2 \times .9$

115. Written Exercises.

I. Multiply .24 by .6.

$$\begin{array}{r} .24 \\ \times .6 \\ \hline .144 \end{array} \quad \textit{Ans.}$$

There are *two* decimal places in the multiplicand and *one* place in the multiplier. Point off *three* decimal places in the product.

II. Multiply .026 by 3.4.

$$\begin{array}{r} .026 \\ \times 3.4 \\ \hline 104 \\ 78 \\ \hline .0884 \end{array} \quad \textit{Ans.}$$

We are to point off four decimal places in the product. As only three figures were obtained by multiplying, we prefix a naught to 884 to make the fourth figure, before we write the decimal point.

Prove that the answer is correct by changing .026 and 3.4 to common fractions, multiplying them, and reducing the result to a decimal.

III. Multiply .04 by .05.

$$\begin{array}{r} .04 \\ \times .05 \\ \hline .002\cancel{0} \end{array} \quad \textit{Ans.}$$

After multiplying and pointing off, we get .0020. Cross off the last naught. Why?

In multiplying decimals, *multiply as with whole numbers and point off as many places in the product as there are decimal places in the multiplicand and the multiplier together.*

Prefix as many naughts to the product as are needed to make the required number of places. Cross off any naughts at the right of the decimal in the product.

Multiply:

1. $.28 \times .4$
2. $.35 \times .25$
3. $3.5 \times .066$
4. $.28 \times .045$
5. $2.8 \times .0045$
6. $24.6 \times .075$
7. $.032 \times .05$
8. $67.2 \times .004$
9. $3.02 \times .06$
10. $.284 \times 7.05$
11. 4.65×2.04
12. 12.48×1.01
13. $8.8 \times .0075$
14. 400.2×1.05
15. $260.7 \times .101$
16. 2.54×1.205
17. $.0635 \times 22.4$
18. $38.6 \times .0275$

REDUCTION OF DECIMALS

116. Written Exercises.

Some common fractions cannot be changed to decimals without leaving a remainder after dividing. $\frac{1}{7}$, for instance, cannot be changed to an even decimal.

$$\begin{array}{r} 7\underline{)1.000} \\ .142\frac{6}{7} \end{array}$$

In such cases, we carry the division to any number of decimal places required, and write the remainder in fractional form as a part of the quotient.

Reduce to decimals of two places:

1. $\frac{2}{3}$
2. $\frac{5}{6}$
3. $\frac{1}{6}$
4. $\frac{1}{12}$
5. $\frac{5}{12}$
6. $\frac{1}{3}$
7. $\frac{2}{7}$
8. $\frac{11}{12}$
9. $\frac{4}{9}$
10. $\frac{7}{12}$

Reduce to decimals of three places:

11. $\frac{2}{11}$
12. $\frac{8}{9}$
13. $\frac{4}{15}$
14. $\frac{2}{9}$
15. $\frac{7}{15}$
16. $\frac{5}{11}$
17. $\frac{2}{13}$
18. $\frac{7}{9}$
19. $\frac{11}{15}$
20. $\frac{5}{24}$
21. $\frac{6}{7}$
22. $\frac{8}{11}$
23. $\frac{3}{17}$
24. $\frac{8}{13}$
25. $\frac{7}{18}$

To Reduce a Complex Decimal to a Common Fraction

117. Written Exercises.

Reduce $.16\frac{2}{3}$ to a common fraction.

$$.16\tfrac{2}{3} = \frac{16\frac{2}{3}}{100} = \frac{\frac{50}{3}}{100} = \frac{\cancel{50}}{3} \times \frac{1}{\underset{2}{\cancel{100}}} = \frac{1}{6}. \quad \textit{Ans.}$$

In $16\frac{2}{3}$, the fraction $\frac{2}{3}$ is not regarded as occupying a separate decimal place. It is regarded as belonging in hundredths' place with the 6. The decimal $.16\frac{2}{3}$ is read "$16\frac{2}{3}$ hundredths."

Reduce the following to common fractions:

1. $.66\frac{2}{3}$
2. $.33\frac{1}{3}$
3. $.06\frac{2}{3}$
4. $.08\frac{1}{3}$
5. $.14\frac{2}{7}$
6. $.13\frac{1}{3}$
7. $.83\frac{1}{3}$
8. $.28\frac{4}{7}$
9. $.26\frac{2}{3}$
10. $.46\frac{2}{3}$
11. $.58\frac{1}{3}$
12. $.57\frac{1}{7}$
13. $.93\frac{1}{3}$
14. $.86\frac{2}{3}$
15. $.73\frac{1}{3}$
16. $.85\frac{5}{7}$
17. $.23\frac{1}{3}$
18. $.11\frac{1}{9}$
19. $.63\frac{1}{3}$
20. $.55\frac{5}{9}$
21. $.36\frac{2}{3}$
22. $.03\frac{1}{3}$
23. $.22\frac{2}{9}$
24. $.43\frac{1}{3}$
25. $.56\frac{2}{3}$
26. $.76\frac{2}{3}$
27. $.96\frac{2}{3}$
28. $.44\frac{4}{9}$

DIVIDING A DECIMAL BY AN INTEGER

118. Oral Exercises.

1. Divide 45 gallons by 5.
   Divide 45 dollars by 5.
   Divide 45 hats by 5.
   Divide 45 thirds by 5.
   Divide 45 hundredths by 5.

Notice that *the quotient must be of the same kind as the dividend.*

2. Divide 42 hundredths by 7.
3. Divide 18 thousandths by 6.

4. Divide 24 thousandths by 4.
5. Divide 14 hundredths by 2.
6. Divide 9 tenths by 3.
7. Divide 27 thousandths by 1.
8. Divide 27 thousandths by 27.

Divide:

9. .06 by 3	**14.** .045 by 9
10. .016 by 4	**15.** .35 by 7
11. .12 by 6	**16.** .8 by 2
12. .025 by 5	**17.** .006 by 3
13. .25 by 25	**18.** .072 by 9

119. Written Exercises.

1. John can walk .72 of a mile in 12 minutes. What decimal part of a mile can he walk in one minute at this rate?

$$\begin{array}{rl} 12\underline{).72} & \\ .06 & \textit{Ans.} \end{array}$$

2. Divide 4.8 by 16.

$$\begin{array}{rl} .3 & \textit{Ans.} \\ 16\overline{)4.8} & \\ \underline{4\,8} & \end{array}$$

3. Divide 7.24 by 4.

$$\begin{array}{rl} 4\underline{)7.24} & \\ 1.81 & \textit{Ans.} \end{array}$$

Place the decimal point in the quotient directly above or below the decimal point in the dividend. Divide as with whole numbers. The quotient must be a decimal of the same number of places as the dividend.

Divide:

4. .204 by 4
5. 4.25 by 5
6. 6.72 by 6
7. .672 by 6
8. 84.4 by 4
9. .065 by 5
10. .072 by 4
11. 8.68 by 2
12. .004 by 4
13. .26 by 13
14. 2.64 by 132
15. 75.6 by 42
16. .756 by 42
17. 3.006 by 6
18. 3.006 by 18
19. 4.88 by 61
20. 50.05 by 5
21. .094 by 47
22. 36.5 by 73
23. .288 by 24

120. Written Exercises.

Divide .04 by 8.

$$\begin{array}{r} .005 \\ 8\overline{).040} \end{array}\quad \textit{Ans.}$$

As 8 is not contained in 4, we must annex to the dividend as many naughts as are needed to obtain a quotient without a remainder.

Divide:

1. .08 by 16
2. .36 by 72
3. 1.6 by 5
4. .65 by 25
5. 3.7 by 74
6. 3.6 by 24
7. 4.8 by 32
8. 2.75 by 22
9. 3.25 by 125
10. 2.4 by 25
11. .65 by 26
12. .8 by 32
13. 6.5 by 52
14. 27.5 by 44
15. 1.6 by 25

16. $5\underline{).9375}$
17. $4\underline{)16.0012}$
18. $8\underline{).0368}$
19. $5\underline{)10.675}$
20. $65\overline{).00325}$
21. $7\underline{).0875}$
22. $375\underline{).075}$
23. $4\underline{).005}$
24. $125\underline{).0625}$
25. $2\underline{)6.025}$
26. $25\overline{).1}$
27. $4\underline{).075}$
28. $4\underline{).002}$
29. $11\overline{).055}$
30. $64\overline{).032}$
31. $48\underline{)6.36}$
32. $75\overline{).3}$
33. $32\overline{)3.}$
34. $48\overline{)24.48}$
35. $24\overline{)6.}$

DIVIDING A DECIMAL BY 10, 20, 30, ETC.

121. Written Exercises.

1. Divide .4 by 10. *Ans.* .04.

$$\begin{array}{r} .04 \\ 10\overline{).40} \end{array}$$

2. Divide 3.86 by 10. *Ans.* .386.

$$\begin{array}{r} .386 \\ 10\overline{)3.860} \end{array}$$

3. Divide .0345 by 10. *Ans.* .00345.

$$\begin{array}{r} .00345 \\ 10\overline{).03450} \end{array}$$

In each of the above examples, compare the quotient with the dividend. What has been done with the decimal point in the dividend?

To divide a decimal by 10, we *move the decimal point one place to the left.*

Write the answers obtained by dividing each of the following decimals by 10:

4. 3.6
5. 20.04
6. 10.067
7. .36
8. 4.565
9. .28
10. .376
11. .025
12. 3.075
13. 25.3
14. 80.042
15. .036
16. .0007
17. .03
18. 2.056
19. .74
20. .065
21. 2.7
22. 2.03
23. 13.75
24. 12.056
25. 60.6
26. 350.42
27. 17.01
28. .005

What is the shortest way of dividing a decimal by 10?

122. Written Exercises.

1. Divide .0756 by 20.

Divide both dividend and divisor by 10. We do this in the dividend by moving the decimal place one point to the left, and in the divisor by canceling the naught.

$$2\cancel{0})\underline{.0/0756}$$

.00378 *Ans.*

2. Divide 6.075 by 50.

$$5\cancel{0})\underline{.6/075}$$

.1215 *Ans.*

3. Divide 64.9 by 110.

$$11\cancel{0})\underline{6.4/9}$$

.59 *Ans.*

Divide:

4. 32.7 by 30
5. .0064 by 40
6. 3 by 50
7. 1.6 by 20
8. .0175 by 50
9. .042 by 70
10. .60 by 120
11. 89.79 by 30
12. 6.4 by 160
13. 10.56 by 220
14. .0729 by 270
15. 7.5 by 40
16. .012 by 50
17. 4.8 by 250
18. .24 by 150
19. .002 by 40
20. 2.85 by 20
21. 4.8 by 120
22. .0625 by 50
23. .68 by 170
24. 126.36 by 90
25. 11.5 by 230
26. .034 by 170
27. .0144 by 120
28. 7.6 by 190
29. 1.65 by 330

DIVIDING A DECIMAL BY 100, 200, 300, ETC.

123. Written Exercises.

1. Divide 38.65 by 100.

$$\begin{array}{r} .3865 \\ 100\overline{)38.6500} \end{array} \quad \textit{Ans.}$$

2. Divide .08 by 100.

$$\begin{array}{r} .0008 \\ 100\overline{).0800} \end{array} \quad \textit{Ans.}$$

3. Divide .258 by 100.

$$\begin{array}{r} .00258 \\ 100\overline{).25800} \end{array} \quad \textit{Ans.}$$

In each of the above examples, compare the quotient with the dividend. What has been done with the decimal point in the dividend?

To divide a decimal by 100, how many places to the left must we move the decimal point?

Write the answers obtained by dividing each of the following decimals by 100:

4. 325.6
5. .03
6. .7
7. 7.4
8. 10.07
9. 2.08
10. 3.05
11. 6.001
12. 150.7
13. 35.6
14. 6.25
15. 2.50
16. .07
17. 7.02
18. 18.68
19. .77
20. .365
21. 683.2
22. .6
23. 2.025

What is the shortest way of dividing a decimal by 100?

124. Written Exercises.

1. Divide 62.4 by 200.

Explanation

Divide both dividend and divisor by 100, and we have $2\underline{).624}$.

$$200\underline{)62.4} \qquad \begin{array}{r} 2\underline{).624} \\ .312 \end{array}$$

Short Process

$$\begin{array}{r} 2\cancel{0}\cancel{0}\underline{).62|4} \\ .312 \end{array} \quad \textit{Ans.}$$

2. Divide 4.56 by 800.

$$8\cancel{0}\cancel{0})\underline{.04|56}$$

.0057 *Ans.*

3. Divide 156 by 1,200.

$$12\cancel{0}\cancel{0})\underline{1.56|}$$

.13 *Ans.*

Divide:

4. 2.8 by 400
5. .036 by 200
6. .72 by 900
7. .648 by 800
8. 253.2 by 300
9. 19.6 by 1,400
10. .396 by 1,100
11. 2.56 by 1,600
12. 4.6 by 2,300
13. .054 by 900
14. .035 by 70
15. 2.7 by 5,400
16. .68 by 1,700
17. .08 by 500
18. .16 by 3,200
19. 5.6 by 1,400
20. 3.6 by 1,500
21. 6 by 2,500
22. 2 by 1,600
23. 2.7 by 1,800
24. 3.2 by 500
25. 40.96 by 800

125. Written Problems.

1. An automobile ran 500.22 miles in a 6-hour race. What was the average rate per hour?

2. In a 12-hour race, an automobile averaged 82.72 miles per hour. How far did it go in the race?

3. In a Marathon road race of 20 miles, the winner averaged 8.432 minutes for each mile. How many minutes did it take him to run the entire distance?

4. The second man in the Marathon race (Ex. 3) averaged .216 of a minute more for each mile. How many minutes was he behind at the finish?

5. The third man was 1.75 miles behind the winner (Ex. 3) at the finish. How far had he gone when the winner finished?

6. The classroom is 15 ft. high. James is 4.52 ft. tall. How far is it from the top of his head to the ceiling of the classroom?

7. William is 4.19 ft. tall and Robert is 5.2 ft. tall. How much taller is Robert than William?

8. Bridgeport is 55.92 miles northeast of New York and New Haven is 73.23 miles northeast of New York. How many miles is it from Bridgeport to New Haven?

9. Three boys walk as far as they can in an hour. Edward walks 4.41 miles, James 3.75 miles, and Henry 3.096 miles. What is the total distance walked by the three?

10. By how much does Edward beat Henry (Ex. 9)?

11. Frank, George, and Harry ran a 220-yard race. Frank beat George by 12.75 yards, and Harry by 20.35 yards. How far had George and Harry each run when Frank finished the race?

12. A motor cycle can go a mile in 48 seconds. The best racing time made by man is 5.4 times that made by the motor cycle. What is the man's time?

13. A large factory burns coal during the cold season as follows: November 12.65 tons, December 19.38 tons, January 22.025 tons, February 20.56 tons, March 17.36 tons, and April 7.95 tons. How much coal is burned during these months?

14. What would this coal (Ex. 13) cost at $5 per ton?

15. During a certain year, the snowfall in New York City was as follows: December 2.95 inches, January 7.24 inches, February 11.35 inches, and March 6.4 inches. What was the total snowfall for that year?

16. From home plate to second base is 127.317 ft. From home plate to pitcher's box is 65 ft. How far is it from the pitcher's box to second base?

17. Our back yard is 40.65 ft. long and 21 ft. wide. How many square feet are there in the yard?

DENOMINATE UNITS

126. Written Exercises.

1. At $.15 a half pint, find the cost of $2\frac{1}{2}$ gal. of pure cream.

2. A storekeeper bought 2 gross of pencils at $1.50 a gross and sold them for $.02 each. How much did he make on the pencils?

3. What will it cost to fence a lot 156 ft. long by 85 ft. wide at $.35 a foot?

4. A fruit dealer bought 432 bananas. At an average price of $.15 a dozen, how much would he receive for them?

5. How many weeks and days are there in the months of September, October, November, and December, all together?

6. A grocer bought 6 bu. of cranberries at $2.50 a bushel. He lost by careless measuring $\frac{1}{8}$ pk. in each bushel and sold the remainder at the rate of 2 qt. for $.25. How much did he make in all?

7. Tom's mother paid him $.20 an hour for weeding the garden. How much would he earn if he worked from 8.30 A.M. to 11.15 A.M.?

8. What will it cost to make a tennis court 78 ft. long by 36 ft. wide at $.01$\frac{1}{3}$ a square foot?

9. Find the perimeter in feet of a field 260 yd. long and 130 yd. wide.

10. A farmer used $6\frac{2}{3}$ qt. of corn to plant an acre. How many acres could he plant with 3 bu. of corn?

FRACTIONAL PARTS OF A DOLLAR

127. Oral Problems.

TYPE PROBLEM. What is the cost of 12 yd. of velvet at $2.25 a yard?

$\$2.25 = \$2\frac{1}{4}$. $12 \times 2\frac{1}{4} = \$27$. *Ans.*

Multiply the following, using a fraction instead of the number of cents:

1. $15 \times \$1.20$
2. $10 \times \$2.50$
3. $8 \times \$6.25$
4. $12 \times \$1.75$
5. $16 \times \$1.12\frac{1}{2}$
6. $36 \times \$.75$
7. $18 \times \$.16\frac{2}{3}$
8. $48 \times \$.66\frac{2}{3}$
9. $9 \times \$2.33\frac{1}{3}$
10. $18 \times \$1.16\frac{2}{3}$
11. $6 \times \$2.66\frac{2}{3}$
12. $12 \times \$1.50$
13. $25 \times \$2.20$
14. $68 \times \$.12\frac{1}{2}$
15. $27 \times \$.33\frac{1}{3}$
16. $37 \times \$.20$

BILLS

128. Written Exercises.

1. Abraham & Straus, of Brooklyn, N. Y., send their monthly statement to John W. Westman of 216 Beverly Road, Brooklyn, for goods purchased as follows during the month of June, 1917: June 4, $2\frac{1}{2}$ yd. percaline @ 15¢, $3\frac{1}{2}$ yd. silk @ 75¢, 1 umbrella \$1.49. June 7, 2 waists @ \$1.98, 1 bag 75¢. June 11, 1 raincoat \$6.75, $3\frac{3}{4}$ yd. ribbon @ 36¢. June 20, 3 yd. ruching @ 49¢, 1 blotter 33¢. Make out a receipted bill.

2. The Diamond Dairy Co., of Michigan Ave., Chicago, Ill., sends out a monthly bill to one of its customers. This customer has taken daily $1\frac{1}{2}$ qt. of milk at 8¢ a quart and a half pint of cream at 12¢ a half pint. At different times he has bought $2\frac{1}{2}$ doz. eggs, 2 doz. eggs, and $1\frac{1}{2}$ doz. eggs; and 2 lb., 3 lb., and $2\frac{1}{2}$ lb. of butter. Make out a bill, using current prices.

3. Mrs. J. H. Miller is boarding at a hotel kept by Mr. Charles Clark. Her bill is rendered to-day for two weeks' board at \$9.75

per week; for 3 dozen pieces of laundry at $.75 a dozen; and for 6 telephone calls at $.05 each. Make out and receipt her bill.

4. Henry Richardson bought from John Woltman the following: On Jan. 6, 1916, 15 sq. yd. velvet carpet at $1.68 a square yard; on Feb. 1, 1916, 2 rugs at $7.50 each and 1 umbrella stand for $3. Make out a bill for these goods and receipt it as clerk.

5. Make out a bill of 5 items purchased on two different days from your grocer. Receipt the bill as clerk.

129. Written Problems.

1. From the sum of $3\frac{1}{8}$ and $2\frac{2}{3}$ take their difference.

2. Multiply the sum of $2\frac{2}{5}$ and $1\frac{2}{3}$ by their difference.

3. The divisor is $1\frac{7}{10}$ and the quotient is $3\frac{3}{8}$. What is the dividend?

4. The multiplicand is $2\frac{3}{5}$ and the product is $17\frac{1}{3}$. Find the multiplier.

5. What would $5\frac{1}{2}$ tons of coal cost at $\$6\frac{3}{4}$ a ton?

6. A farm hand mows $2\frac{3}{5}$ acres a day. How long would it take him to mow a field containing $8\frac{2}{3}$ acres?

7. How much would the farm hand (Ex. 6) receive for his work at $\$2\frac{1}{4}$ per day?

8. At the same rate (Ex. 7), how many days would he have to work to earn enough to pay for a suit costing $\$15\frac{3}{4}$?

9. I bought at the grocer's 4 lb. of coffee at 36¢ a pound and $3\frac{1}{2}$ lb. of sugar at 8¢ a pound. How much change should I receive from a five-dollar bill?

10. A dealer bought eggs at $24\frac{1}{2}$¢ a dozen and sold them at 36¢ a dozen. How many dozen would he have to sell to make a profit of $23?

11. Write in words the following: $\frac{100}{250}$, 6,060,006, .0012.

12. Edward and Harry, starting together, walk in the same direction. Edward walks at the rate of $2\frac{2}{3}$ miles an hour and Harry at the rate of $3\frac{1}{4}$ miles an hour. How far ahead of Edward will Harry be after they have walked $2\frac{2}{3}$ hours?

13. If Edward (Ex. 12) had a start of $3\frac{1}{9}$ miles, how long would it take Harry to overtake him?

14. If Edward and Harry (Exs. 12, 13), starting from the same place, should walk in opposite directions, how far apart would they be in $2\frac{2}{5}$ hours?

15. A family uses .675 of a pound of butter a day. How much would it use in the month of November?

16. What would the butter used in November (Ex. 15) cost at the rate of 32¢ a pound?

130. Written Problems.

THE SHOE FACTORY

A large shoe factory employs 1,200 men, women, boys, and girls. The employees work nine hours a day for five days of the week and seven hours on Saturday — a total of 52 hours a week.

The labor is divided among eight departments, so that one employee does a very small portion of the entire work on a shoe.

Mr. Ames and his daughter Mary work in the Cutting Department.

1. Mr. Ames cuts "uppers." He receives 8 cents a pair for his work and can cut 8 pairs an hour. What are his weekly earnings at this rate?

2. Mary "stamps outsides" for which the company pays at the rate of 15 cents for 100 pairs. She can stamp 100 pairs in an hour. How much could she earn in a week at that rate?

3. Her brother Stephen works in the Packing Department. He receives $\frac{1}{3}$ of a cent a pair and can pack 78 pairs of shoes in an hour. How much does he earn in a week at that rate?

4. How much do the three members of the family earn in a week in which Tuesday is a holiday?

5. How much would the family earn in a month in which there were 19 full working days and 5 Saturdays?

6. A neighbor, Mr. Allen, is in the Machine Department. He trims heels and receives 90 cents for each 100 pairs. He can trim 76 pairs in an hour. How much can he earn in a week at that rate? How much in a full working day?

7. During a strike he lost pay for 12 full days and 3 Saturdays. How much did he lose during the strike?

8. In the Welt Department, boys are employed in trimming by hand at the rate of 25 cents for 100 pairs. How many pairs would a boy have to trim during the week to earn $10.40? How many pairs per hour would this be?

9. In the Packing Department, girls earn 3 cents per dozen pairs for lacing shoes. How many pairs of shoes would a girl have to lace in order to earn $9.75 a week? How many pairs an hour would this be?

10. In the Retail Department, only rejected shoes (those that have not passed the strict factory inspection) are sold. These may be purchased for $\frac{7}{12}$ of the regular retail prices. How much is saved in buying, in the Retail Department, a shoe that costs $6 at regular retail prices?

FOURTH QUARTER

COUNTING

131. Oral Exercises.

1. Beginning with 4, count by 7's to 102.
2. Beginning with 15, count by 8's to 111.
3. Beginning with 5, count by 8's to 101.
4. Beginning with 6, count by 9's to 114.
5. Beginning with 11, count by 11's to 132.
6. Beginning with 12, count by 12's to 144.

ADDITION

132. Oral Exercises.

Give at sight the sums of the following numbers:

1. $\begin{array}{r}508\\ \underline{527}\end{array}$

2. $\begin{array}{r}520\\ \underline{270}\end{array}$

3. $\begin{array}{r}280\\ \underline{190}\end{array}$

4. $\begin{array}{r}930\\ \underline{390}\end{array}$

5. $\begin{array}{r}450\\ \underline{175}\end{array}$

6. $\begin{array}{r}630\\ \underline{480}\end{array}$

7. $\begin{array}{r}320\\ \underline{280}\end{array}$

8. $\begin{array}{r}510\\ \underline{370}\end{array}$

9. $\begin{array}{r}525\\ \underline{250}\end{array}$

10. $\begin{array}{r}810\\ \underline{360}\end{array}$

11. $\begin{array}{r}530\\ \underline{270}\end{array}$

12. $\begin{array}{r}710\\ \underline{490}\end{array}$

13. $\begin{array}{r}675\\ \underline{450}\end{array}$

14. $\begin{array}{r}740\\ \underline{290}\end{array}$

15. $\begin{array}{r}640\\ \underline{270}\end{array}$

16. $\begin{array}{r}400\\ \underline{280}\end{array}$

17. $\begin{array}{r}840\\ \underline{770}\end{array}$

18. $\begin{array}{r}950\\ \underline{680}\end{array}$

19. $\begin{array}{r}850\\ \underline{390}\end{array}$

20. $\begin{array}{r}530\\ \underline{160}\end{array}$

133. Written Exercises.

1. 968,954
839,769
457,486
768,935
643,874
395,388
425,786
835,785
594,782
248,950

2. 495,687
937,958
642,695
529,796
358,497
737,489
839,456
958,537
429,698
865,954

3. 958,965
739,787
565,859
828,695
437,854
992,893
328,849
816,487
425,894
654,538

4. 359,695
684,738
945,963
527,859
795,674
859,885
569,584
927,695
437,487
258,979

5. 893,897
458,659
743,965
657,095
568,778
995,969
857,843
342,678
278,549
994,589

6. 589,654
327,985
786,896
979,869
458,857
267,594
658,964
839,728
452,976
729,543

7. $673.96
958.75
690.87
87.56
9.63
477.94
598.76
957.83
695.58
76.95

8. $959.85
438.90
75.63
507.47
869.54
37.48
694.72
958.89
74.57
9.19

9. $588.92
697.58
379.35
854.73
919.59
67.75
943.94
97.68
108.17
54.63

10.	**11.**	**12.**
567,894	98,547	8,637
6,958,786	1,476,958	409,789
195,958	58,739	5,976,975
9,569	5,987	87,894
708,647	5,896,436	698,793
86,395	87,585	9,589
574,874	654,937	587,695
9,369,759	4,986,569	6,958,476
847,693	87,494	94,387
85,976	395,875	576,968

13.	**14.**	**15.**
798,365	93,876	8,935
5,679,837	879,598	605,679
387,986	3,567,985	93,856
56,798	7,098,669	6,769,798
4,968,569	456,437	538,587
9,475	9,685	9,757,374
7,985,687	5,977,974	986,759
576,894	693,569	4,497,967
59,769	6,589,643	3,678,688
8,765,947	276,957	954,859

16. Add:

Eight hundred thousand seventy,

Seventeen thousand nine hundred sixty-five,

Thirty-four million seven hundred eighty-nine thousand six hundred seven,

Nine million seventy thousand eight,

Nine hundred nineteen thousand eight hundred eighty,

Sixty-seven million six hundred ninety-eight thousand seven hundred fifty-nine,

Forty-six thousand five hundred ninety-six.

17. Add:

Eighty dollars and ninety-eight cents,

Sixty-seven thousand nine hundred dollars and seventeen cents,

Nine dollars and fifty-four cents,

Eight thousand seven hundred six dollars and seventy cents,

Ninety thousand five hundred ninety-eight dollars and six cents,

Six thousand eight hundred seventy-nine dollars and eighty-five cents,

Nine hundred eighty-seven dollars and sixty-nine cents.

SUBTRACTION

134. Oral Exercises.

Find at sight the amount of purchase or the amount of change in each of the following:

	AMOUNT OF PURCHASE	AMOUNT GIVEN TO STOREKEEPER	CHANGE		AMOUNT OF PURCHASE	AMOUNT GIVEN TO STOREKEEPER	CHANGE
1.	?	$20.00	$6.71	**14.**	?	$10.00	$3.54
2.	$2.87	10.00	?	**15.**	?	1.50	.17
3.	2.21	2.50	?	**16.**	$6.37	10.00	?
4.	?	10.00	7.25	**17.**	?	20.00	5.44
5.	2.62	5.00	?	**18.**	3.82	5.00	?
6.	7.28	20.00	?	**19.**	7.63	10.00	?
7.	?	20.00	1.78	**20.**	1.63	2.00	?
8.	1.41	2.00	?	**21.**	?	20.00	6.52
9.	?	1.25	.18	**22.**	?	10.00	4.67
10.	.23	1.00	?	**23.**	?	1.00	.33
11.	?	5.00	2.17	**24.**	2.87	5.00	?
12.	6.68	20.00	?	**25.**	5.38	10.00	?
13.	?	2.00	.73	**26.**	?	.75	.19

135. Written Exercises.

1. $\begin{array}{r} \$3{,}963.87 \\ -\quad 968.98 \\ \hline \end{array}$

2. $\begin{array}{r} \$1{,}500.60 \\ -\quad 697.85 \\ \hline \end{array}$

3. $\begin{array}{r} \$5{,}872.25 \\ -\ 3{,}796.57 \\ \hline \end{array}$

4. $\begin{array}{r} 9{,}854{,}327 \\ -\ 1{,}976{,}489 \\ \hline \end{array}$

5. $\begin{array}{r} 3{,}004{,}060 \\ -\ 2{,}767{,}938 \\ \hline \end{array}$

6. $\begin{array}{r} 5{,}160{,}213 \\ -\ 2{,}673{,}274 \\ \hline \end{array}$

7. $\begin{array}{r} 3{,}200{,}000 \\ -\ 1{,}967{,}384 \\ \hline \end{array}$

8. $\begin{array}{r} 3{,}004{,}060 \\ -\ 2{,}378{,}674 \\ \hline \end{array}$

9. $\begin{array}{r} 9{,}638{,}522 \\ -\ 5{,}067{,}938 \\ \hline \end{array}$

10. $\begin{array}{r} 5{,}947{,}321 \\ -\ 3{,}895{,}639 \\ \hline \end{array}$

11. $\begin{array}{r} 2{,}438{,}427 \\ -\ 1{,}399{,}638 \\ \hline \end{array}$

12. $\begin{array}{r} 3{,}562{,}783 \\ -\ 1{,}587{,}695 \\ \hline \end{array}$

13. $\begin{array}{r} 6{,}834{,}205 \\ -\ 5{,}929{,}306 \\ \hline \end{array}$

14. $\begin{array}{r} 3{,}100{,}101 \\ -\ 2{,}901{,}102 \\ \hline \end{array}$

15. $\begin{array}{r} 1{,}001{,}030 \\ -\quad 905{,}025 \\ \hline \end{array}$

16. When the minuend is 5,234,162 and the remainder is 2,675,878, what is the subtrahend?

17. How much more than 2,987,657 is 2,991,323?

18. From $9,801.17 take $8,797.89.

19. Find the difference between $19,010.13 and $786.98.

20. Subtract 4,932,649 from 7,122,132.

MULTIPLICATION

136. Oral Exercises.

Give answers at sight:

1. $\begin{array}{r} 25 \\ \times\quad 6 \\ \hline \end{array}$

2. $\begin{array}{r} 40 \\ \times\ 200 \\ \hline \end{array}$

3. $\begin{array}{r} 55 \\ \times\ 20 \\ \hline \end{array}$

4. $\begin{array}{r} 50 \\ \times\ 80 \\ \hline \end{array}$

5. $\begin{array}{r} 25 \\ \times\ 40 \\ \hline \end{array}$

6. $\begin{array}{r} 150 \\ \times\ 30 \\ \hline \end{array}$

7. $\begin{array}{r} 75 \\ \times\ 40 \\ \hline \end{array}$

8. $\begin{array}{r} 707 \\ \times\quad 7 \\ \hline \end{array}$

9. $\begin{array}{r} 60 \\ \times\ 80 \\ \hline \end{array}$

10. $\begin{array}{r} 70 \\ \times\ 90 \\ \hline \end{array}$

11. 125 × 40 **13.** 305 × 9 **15.** 310 × 9 **17.** 610 × 5 **19.** 31 × 90

12. 202 × 40 **14.** 81 × 7 **16.** 81 × 9 **18.** 91 × 9 **20.** 710 × 4

137. Written Exercises.

1. 69,785 × 87 **5.** 93,898 × 67 **9.** 49,875 × 507

2. 98,476 × 96 **6.** 47,965 × 94 **10.** 58,769 × 478

3. 57,904 × 59 **7.** 85,678 × 608 **11.** 36,798 × 926

4. 87,954 × 89 **8.** 78,956 × 709 **12.** 65,938 × 385

DIVISION

138. Oral Exercises.

Divide at sight:

1. 7)1,449 **5.** 8)8,056 **9.** 9)9,810 **13.** 11)363 **17.** 12)1,320

2. 5)7,510 **6.** 6)6,036 **10.** 4)5,680 **14.** 7)7,063 **18.** 8)6,416

3. 9)9,054 **7.** 11)1,320 **11.** 12)7,224 **15.** 5)5,605 **19.** 6)7,266

4. 4)2,884 **8.** 7)1,484 **12.** 8)8,408 **16.** 9)4,572 **20.** 12)8,424

139. Written Exercises.

1. 1,326,423 ÷ 468 **3.** 5,600,476 ÷ 958

2. 2,457,689 ÷ 753 **4.** 4,263,858 ÷ 509

5. 5,070,432 ÷ 308
6. 4,963,000 ÷ 607
7. 2,006,734 ÷ 750
8. 1,468,795 ÷ 960
9. 2,834,940 ÷ 870
10. 326,754 ÷ 900
11. 195,300 ÷ 700
12. 586,935 ÷ 800

140. Oral Exercises.

1. Find $\frac{3}{11}$ of
2. Find $\frac{5}{11}$ of
3. Find $\frac{8}{11}$ of
4. Find $\frac{10}{11}$ of

22
44
66
88
132
1
55
121
33
77
110
99

5. Find $\frac{5}{12}$ of
6. Find $\frac{7}{12}$ of
7. Find $\frac{11}{12}$ of

60
108
36
84
132
12
1
72
144
24
96
48

APPROXIMATE ANSWERS

141. Exercises.

First give an approximate answer. Then work the example with pencil and paper and compare the result with your approximate answer.

1. Find the cost of 198 bu. of potatoes at $.75 a bushel.

2. A cheese weighs $48\frac{3}{4}$ lb. What is it worth at $.22 a pound?

3. I paid $20 for a railroad ticket from New York to Chicago, a distance of 912 miles. What was the average cost per mile?

4. What would 24 pk. 3 qt. of apples cost at $.40 a peck?

5. What is the cost of 24 ft. 9 in. of molding at $.08 a foot?

142. Exercises.

Give approximate answers:

1. $35 \times 9\frac{8}{9}$
2. $47 \times 98\frac{1}{2}$
3. $59 \times 9\frac{7}{8}$
4. $83 \times 10\frac{1}{32}$
5. $24 \times 1\frac{15}{16}$
6. 880×11
7. 946×101
8. $322 \times 19\frac{7}{8}$
9. $584 \times 50\frac{1}{8}$
10. 101×97
11. $875 \times \frac{17}{18}$
12. 480×51
13. $700 \div 99$
14. $840 \div 198$
15. $520 \div \frac{49}{50}$
16. $650 \div \frac{14}{15}$
17. $675 \div 68$
18. $22 \div 3\frac{1}{7}$
19. $620 \div 19$
20. $650 \div 101$
21. $240 \div 10\frac{1}{5}$
22. $200 \div 25\frac{1}{8}$
23. $192 \div 97$
24. $56 \div 3\frac{7}{8}$

Find, with paper and pencil, the exact answers. Then see how nearly exact your approximate answers are.

ADDITION AND SUBTRACTION OF FRACTIONS

143. Written Exercises.

Add:

1. $\frac{8}{14} + \frac{11}{21} + \frac{8}{35} + \frac{5}{6} + \frac{7}{15} + \frac{3}{10}$.
2. $\frac{7}{8} + \frac{1}{10} + \frac{8}{35} + \frac{9}{70} + \frac{3}{14} + \frac{19}{20}$.
3. $\frac{5}{9} + \frac{5}{6} + \frac{7}{12} + \frac{19}{22} + \frac{1}{18} + \frac{2}{33}$.
4. $\frac{9}{22} + \frac{11}{21} + \frac{9}{14} + \frac{1}{6} + \frac{16}{33} + \frac{5}{7}$.
5. $\frac{3}{4} + \frac{2}{3} + \frac{17}{20} + \frac{5}{12} + \frac{19}{25} + \frac{11}{15}$.
6. $19\frac{7}{10} + 26\frac{5}{8} + 17\frac{9}{14} + 38\frac{15}{16} + 85\frac{3}{32}$.
7. $54\frac{5}{7} + 8\frac{1}{2} + 37\frac{2}{3} + 46\frac{3}{5} + \frac{7}{12}$.
8. $28\frac{11}{14} + 63\frac{5}{7} + 49\frac{20}{21} + 75\frac{5}{6} + 8\frac{2}{3}$.
9. $70\frac{7}{48} + 38\frac{7}{12} + 96\frac{5}{6} + 32\frac{1}{2} + 27\frac{2}{3}$.
10. $44\frac{1}{13} + 56\frac{5}{6} + 17\frac{3}{4} + 28\frac{1}{2} + 15\frac{2}{3}$.

Subtract:

11. $\begin{array}{r} 832\frac{2}{17} \\ -175\frac{3}{5} \\ \hline \end{array}$
12. $\begin{array}{r} 705\frac{5}{17} \\ -369\frac{19}{51} \\ \hline \end{array}$
13. $\begin{array}{r} 800\frac{2}{5} \\ -327\frac{7}{8} \\ \hline \end{array}$
14. $\begin{array}{r} 684\frac{2}{7} \\ -279\frac{44}{91} \\ \hline \end{array}$

15. $\begin{array}{r} 913\frac{11}{12} \\ -677\frac{5}{9} \\ \hline \end{array}$

16. $\begin{array}{r} 532\frac{1}{22} \\ -197\frac{1}{8} \\ \hline \end{array}$

17. $\begin{array}{r} 824\frac{5}{6} \\ -626\frac{9}{13} \\ \hline \end{array}$

18. $\begin{array}{r} 902\frac{2}{3} \\ -278\frac{7}{8} \\ \hline \end{array}$

19. $(\frac{1}{3} - \frac{1}{8}) - (\frac{2}{3} - \frac{1}{2}) = ?$

20. $(\frac{3}{8} - \frac{7}{24}) - (\frac{1}{6} - \frac{1}{8}) = ?$

21. $(1\frac{1}{2} - \frac{3}{4}) - (\frac{2}{3} - \frac{1}{5}) = ?$

22. $(2\frac{1}{3} - \frac{3}{4}) - (4\frac{1}{8} - 2\frac{13}{16}) = ?$

MULTIPLICATION AND DIVISION OF FRACTIONS

144. Written Exercises.

Multiply:

1. $5\frac{1}{3} \times 7\frac{2}{7} \times 3\frac{3}{8} \times 7\frac{1}{5} \times \frac{2}{9}$.

2. $4\frac{2}{3} \times \frac{9}{16} \times 8\frac{3}{4} \times \frac{2}{7} \times 1\frac{3}{5}$.

3. $6\frac{1}{4} \times 8 \times 5\frac{1}{7} \times 6\frac{1}{8} \times \frac{7}{45}$.

4. $9\frac{2}{7} \times 4\frac{1}{5} \times \frac{7}{9} \times \frac{5}{8} \times 11$.

5. $9\frac{3}{4} \times 9\frac{3}{5} \times \frac{11}{12} \times \frac{5}{7} \times 8\frac{1}{7}$.

6. $4\frac{8}{9} \times 8\frac{5}{8} \times \frac{3}{23}$.

7. $8\frac{13}{15} \times 8\frac{4}{7} \times 3\frac{8}{9}$.

8. $8\frac{3}{4} \times 2\frac{2}{7} \times \frac{2}{9} \times 3\frac{1}{2}$.

9. $8\frac{4}{5} \times 6\frac{1}{4} \times 6\frac{2}{3} \times 1\frac{4}{11} \times \frac{1}{17}$.

10. $726 \times 47\frac{5}{6}$.

Divide:

11. $896 \div \frac{7}{9}$

12. $768 \div \frac{5}{8}$

13. $532 \div 4\frac{3}{4}$

14. $938 \div 5\frac{5}{6}$

15. $\frac{11}{15} \div 2\frac{4}{9}$

16. $\frac{13}{17} \div 5\frac{4}{7}$

17. $385\frac{1}{2} \div \frac{3}{7}$

18. $468\frac{12}{17} \div \frac{5}{6}$

19. $\frac{7}{16} \div \frac{17}{20}$

20. $\frac{35}{132} \div \frac{7}{12}$

21. $23\frac{1}{4} \div 1\frac{15}{16}$

22. $66\frac{2}{3} \div 12\frac{1}{2}$

23. Reduce to simplest form: $\frac{5\frac{1}{2} - 3\frac{5}{8}}{15\frac{3}{4}}$.

24. Simplify: $\frac{\frac{2}{3} + \frac{5}{8} - \frac{1}{6}}{\frac{5}{6}}$.

25. Change to simplest form: $\frac{6 \times 2\frac{1}{2} + \frac{4}{9}}{\frac{1}{2}}$.

PARTS OF NUMBERS

145. Oral Exercises.

What part of

1. 1 foot is 1 inch?
2. 1 foot is 2 inches?
3. 2 feet is 3 inches? (2 feet is how many inches?)
4. 1 yard is 2 feet?
5. 3 yards is 4 feet?
6. 1 yard is 11 inches?

What part of

7. 5 feet is 7 inches?
8. 1 gallon is 1 quart?
9. 1 gallon is 3 quarts?
10. 3 gallons is 2 quarts?
11. 1 gallon is 1 pint?
12. 2 gallons is 3 pints?
13. 3 gallons is 2 pints?
14. 1 peck is 1 quart?
15. 3 pecks is 3 quarts?
16. 2 pecks is 3 quarts?
17. 1 bushel is 1 peck?
18. 3 bushels is 5 pecks?
19. 1 bushel is 1 quart?
20. 2 bushels is 3 quarts?

146. Written Problems.

Type Problem. If $2\frac{1}{2}$ yd. of flannel cost 15¢, how many yards can be bought for 24¢, at the same rate?

15¢ ÷ $2\frac{1}{2}$ = 6 cents, the cost of 1 yd. For 24¢, we could buy as many yards as there are 6's in 24, or 4 yd. *Ans.*

1. It took $26\frac{1}{4}$ yd. of silk to make 7 pennants. How many pennants of the same kind can be made from $33\frac{3}{4}$ yd.?

2. When $3\frac{1}{3}$ doz. oranges cost $1.50, how many dozen oranges of the same kind can be bought for $4.50?

3. Thirteen tons of coal cost \$$87\frac{3}{4}$. How many tons can be bought for \$$67\frac{1}{2}$, at the same rate?

4. An automobile goes $52\frac{1}{2}$ miles in $2\frac{1}{3}$ hours. In how many hours would the automobile go $73\frac{1}{8}$ miles, at the same rate?

5. 11 bottles of a certain size were filled from a barrel containing $30\frac{1}{4}$ quarts. How many bottles of that size could be filled with $46\frac{3}{4}$ quarts?

6. A train travels $255\frac{1}{3}$ miles in 7 hours. At that rate, how long will it take the train to travel $337\frac{5}{8}$ miles?

7. A load of potatoes containing $20\frac{3}{4}$ bu. cost $13.28. At that rate, how many bushels could be purchased for $6.72?

8. How many yards of silk can be bought for $4.29 when $11\frac{2}{3}$ yards cost $8.25?

9. When $3\frac{1}{6}$ acres of land cost $190, how many acres, at the same price, can be bought for $432?

147. Written Problems.

1. There are 1,760 yd. in a mile. When Frank has run 990 yd., what part of a mile has he gone?

2. John made $1.32 in a week by working after school hours, and Peter made $1.10. What fractional part of John's money is Peter's?

3. Arthur had 48 marbles. He lost $\frac{3}{8}$ of them and gave away $\frac{1}{3}$ of them. How many did he have left?

4. If Arthur (Ex. 3) sold the remainder of the marbles at the rate of 2 for one cent, what did he receive for them?

5. A dealer bought 36⅔ yd. of lawn for $5.50. How much did he pay per yard?

6. Mabel has 68¢, which is 4¼ times what Ada has. How much has Ada?

7. Edward lives ⅘ of a mile from school. Henry lives ⅜ as far from school as Edward does. How far from school does Henry live?

8. Rope costs 2⅜¢ a foot. How much would three pieces measuring 15¾ ft., 112 ft., and 16¼ ft. cost all together?

9. Eben earns $11¼ a week. He pays his mother ⅖ of this for board. His luncheons cost him ⅑ of his salary. How much does he have left for other expenses?

10. At a children's concert, each child was allotted a seating space of 1¼ ft. How many could be seated on a bench 21¼ ft. long?

11. Imagine yourself the clerk in a coal-dealer's office. Make out for the firm a bill to Mr. George H. Magill for 5½ tons of coal at $6.50 and for 4¼ tons at $6.80.

12. Jane and Olive are making dolls' dresses for Christmas presents. If each dress takes ⅚ of a yard of muslin, how many dresses can they make from a piece 20 yd. long?

13. How much would 2⅔ lb. of coffee cost at ⅗ of a dollar a pound?

READING AND WRITING DECIMALS

148. Oral Exercises.

Read the following decimals:

6.000006
35010.6
2805.063
100.01
650.2050
8.008000
20.0020
56.056
.802753
22.80105
900.009
8.6025
12.00909
.000008
7.5075
75.075
750.75
.75075
2.020202
1800.08
267.0267
26.70267
2670.267
26702.67

149. Written Exercises.

Write the following decimals:

1. Seventy-eight millionths.
2. Forty-five and forty-five thousandths.
3. Four hundred millionths.
4. Sixty-eight ten-thousandths.
5. Twelve and twelve thousand twelve millionths.
6. Eighty-one and eighty-one hundredths.
7. Six ten-thousandths.
8. One thousand and one thousandth.
9. Six hundred-thousandths.
10. Twelve ten-thousandths.

REDUCTION OF DECIMALS

150. Written Exercises.

Reduce to common fractions or mixed numbers in their lowest terms:

1. 7.125
2. .625
3. 9.8
4. 4.725
5. .875
6. 5.075
7. 19.0125
8. 63.08
9. 2.05
10. .0375
11. $8.16\frac{2}{3}$
12. $.33\frac{1}{3}$
13. 20.02
14. $12.08\frac{1}{3}$
15. $7.014\frac{2}{7}$
16. .0125
17. $.003\frac{1}{3}$
18. $.83\frac{1}{3}$
19. $.55\frac{5}{9}$
20. $.028\frac{4}{7}$
21. .0075
22. .025
23. $.066\frac{2}{3}$
24. $.016\frac{2}{3}$
25. $.008\frac{1}{3}$
26. $.71\frac{3}{7}$
27. .0625
28. .005
29. $.7\frac{1}{7}$
30. .0375

151. Written Exercises.

Reduce to decimals, carrying the work to four decimal places where necessary:

1. $\frac{2}{7}$
2. $\frac{9}{16}$
3. $\frac{19}{20}$
4. $\frac{2}{9}$
5. $\frac{17}{80}$
6. $\frac{11}{12}$
7. $\frac{7}{125}$
8. $\frac{19}{50}$
9. $\frac{7}{16}$
10. $\frac{5}{6}$
11. $\frac{7}{15}$
12. $\frac{5}{9}$
13. $\frac{17}{40}$
14. $\frac{2}{125}$
15. $\frac{7}{24}$
16. $\frac{5}{7}$
17. $\frac{3}{200}$
18. $\frac{7}{9}$
19. $\frac{13}{15}$
20. $\frac{1}{11}$
21. $\frac{4}{7}$
22. $\frac{9}{80}$
23. $\frac{2}{15}$
24. $\frac{7}{150}$
25. $\frac{6}{7}$
26. $\frac{1}{80}$
27. $\frac{11}{15}$
28. $\frac{13}{125}$
29. $\frac{1}{19}$
30. $\frac{1}{21}$

ADDITION AND SUBTRACTION OF DECIMALS

152. Written Exercises.

Add:

1. Sixty and five hundred seventy-nine thousandths,
Three thousand nine and three hundred nine thousandths,
Eight hundred seventy-six and nine hundredths,
Seven thousand eighty and sixty-five hundredths,
Four hundred fifty-nine and one thousand forty ten-thousandths,
Five thousand three hundred eighty and eight hundredths.

2. Six hundred seven and six hundred thirty thousandths,
Four hundred five thousandths,
Eighty-seven and fifty-one thousandths,
Twenty-nine and six hundredths,
One thousand sixty and nine hundred eight thousandths.

3. Nine and eight hundred five thousandths,
Eight hundred seventy-five and nine hundredths,
Sixty-eight and seven thousandths,
Five hundred fifty and eighty-four hundredths,
Six hundred seventy-eight thousandths,
Eight and seventy-five hundredths.

4. 386.09 + 57.9 + 597.043 + 48.65 + 9.8 + 78.09.

5. 930.007 + 9.68 + 57.607 + 28.408 + 85.09 + 7.9.

6. 97.8 + 609.005 + 350.72 + 60.009 + 59.07 + 380.19.

7. 35.86 + 9.009 + 87.07 + 46.9 + 637.38 + 59.507.

8. 5.9 + 709.006 + 93.95 + 5090.7 + 973.005 + 89.09.

9. 695.07 + 8007.6 + 58.009 + 9.87 + 597.001 + 8.9.

10. .073 + 98.7 + 938.008 + 67.09 + 18.695 + 7.009.

11. 5.096 + 807.153 + 97.0065 + .071 + 9.635 + .7801 + 16.005 +39.0305.

12. .00675 + 93.076 + 15.0167 + 59.1007 + 85.007 + .3095 + 7.159 + .873.

13. .063 + 5.9 + 973.0069 + 47.08 + 567.005 + .753 + 8.078 + 16.57.

14. .93 + 6.005 + 19.087 + 670.583 + 807.975 + 98.0087 + 385.9007 + 9.01.

15. 85.0634 + 7.00902 + 15.01007 + .009 + 675.09 + 43.8072 + 29.0305 + 8.191.

16. 7.4097 + 81.5701 + .0063 + 65.0907 + .19765 + 900.507 + .076 + 307.0085.

17. 97.06 + .0075 + 5.09007 + 19.965 + 300.007 + 20.905 + 7.5093 + 49.904.

18. .0053 + .07936 + 903.507 + 5080.05 + 57.9 + 876.0007 + 39.8 + 6854.0706.

19. .073 + 58.00075 + .9 + 893.0008 + 93.7 + 597.0765 + 64.301 + 6.05027.

20. 93.7 + .00085 + 5780.097 + 8075.1604 + 8.903 + 57.6 + 493.00079 + 18.5 + .953.

153. Written Exercises.

1. Find the difference between 56 thousandths and 106 ten-thousandths.

2. From 9 and 4 hundredths subtract 96 ten-thousandths.

3. Subtract 509 thousandths from 81 hundredths.

4. Take 2 and 98 hundred-thousandths from 6 and 302 thousandths.

5. From 563 and 16 hundredths take 387 and 54 thousandths.

6. 93.007 − 9.63005 = ?

7. 587.1001 − 396.4079 = ?

8. 2105.05 − 873.0093 = ?

9. 1.07 − .9584 = ?

10. 453.261 − 97.5983 = ?

11. 68.0504 − 19.700853 = ?

12. Find the difference between 29.63 and 5.938.

13. From 98.607 subtract 49.0783.

14. Subtract 3.067 from 87.

15. The minuend is 9.321 and the subtrahend is .8763. Find the remainder.

16. Find the difference between 5.976 and 91.8.

17. Subtract 9.008 from 101.1.

18. 510.96 − 398.17 = ?

19. 387.2 − 195.86 = ?

20. 630.01 − 389.675 = ?

21. 4875.9 − 968.304 = ?

MULTIPLICATION OF DECIMALS

154. Written Exercises.

1. 97.86 × 76
2. 39.056 × 58
3. .0968 × .49
4. 6.0857 × 93
5. 95.063 × 580
6. 93.75 × .087
7. 6843 × .0096
8. 5890 × 5.06
9. 398.7 × 8.09
10. 58.006 × 57
11. 63.005 × 80
12. 2000 × .0125
13. 64 × .0625
14. 2.48 × 875
15. 6.006 × 50
16. 6.006 × 500
17. 60.06 × 50
18. .6006 × 500
19. 36.53 × .07
20. 25.063 × 55
21. 325 × 8.004
22. 750 × .0375
23. 3.88 × 24.05
24. 57.5 × 4.008
25. 728 × 3.065
26. 28.84 × 600
27. 170.09 × 68

DIVIDING A DECIMAL BY AN INTEGER

155. Written Exercises.

If the answer does not come out evenly, carry the quotient to five decimal places.

1. 80.368 ÷ 8
2. 9.074 ÷ 3
3. 40.264 ÷ 56
4. 56.029 ÷ 43
5. 256.5 ÷ 38
6. 3.864 ÷ 76
7. 2.509 ÷ 83
8. 56.64 ÷ 80
9. 28.116 ÷ 90
10. 5.8491 ÷ 67
11. 239.09 ÷ 47
12. 6.4 ÷ 37
13. 526.234 ÷ 58
14. .2967 ÷ 69
15. 1.998 ÷ 27
16. 8.64 ÷ 800
17. 43.2 ÷ 600
18. .522 ÷ 600
19. 67.6 ÷ 1300
20. 84.6 ÷ 700
21. 72.5 ÷ 2500
22. .025 ÷ 200
23. 62.5 ÷ 400
24. 640 ÷ 500
25. 64 ÷ 500
26. 6.4 ÷ 500
27. .64 ÷ 500

DIVIDING AN INTEGER BY A DECIMAL

156. Written Exercises.

I. Divide 8 by .4.   .4)8.   4.)80.

20. *Ans.*

II. Divide 36 by .05.   .05)36.   5.)3600.

720. *Ans.*

To change the divisor .4 to a whole number, we multiply it by 10. Then the dividend 8 must be multiplied by 10. Why?

To change the divisor .05 to a whole number, by what do we multiply? 36 must be multiplied by the same number.

A simpler way to express the work is

I. ‸4)8‸0.   II. ‸05.)36‸00.

20.   720.

Before dividing in each of the following examples, change the divisor to a whole number and make the necessary change in the dividend:

1. 375 ÷ .05

2. 2,268 ÷ .07

3. 6,075 ÷ .009

4. 328 ÷ .4

5. 3,924 ÷ .09

6. 286 ÷ .011

7. 68 ÷ .0017

8. 356 ÷ .04

9. 685 ÷ .5

10. 873 ÷ .003

DIVIDING A DECIMAL BY A DECIMAL

157. Written Exercises.

I. Divide .08 by .2.

‸2.)‸0.8

.4

Multiply both divisor and dividend by 10. Why?

II. Divide .075 by .03.

‸03.)‸07.5

2.5

Multiply both divisor and dividend by 100. Why?

III. Divide .074 by .4.

4.)0.740
.185

Annex a naught at the right of the dividend. Why?

In dividing by a decimal, *when the divisor is a decimal or a mixed decimal, change it to a whole number by moving the decimal point to the right. Move the decimal point in the dividend the same number of places to the right.*

Divide as with whole numbers, placing the decimal point in the quotient directly above, or below, the decimal point in the dividend.

The number of decimal places in the quotient must be the same as the number of decimal places in the dividend.

Divide:

1. 16 by .4
2. 28 by .07
3. 325 by .25
4. 75 by .003
5. 27 by .9
6. 356 by 8.9
7. 234 by 1.3
8. 256 by .06
9. 87 by .029
10. 910 by .7
11. 950 by 1.9
12. 275 by .011
13. 625 by 1.25
14. 625 by 12.5
15. 625 by .125
16. 324 by 8.1
17. 676 by 2.6
18. 915 by 3.05
19. 1,000 by 6.25
20. 248 by .31

Divide:

21. .072 by .009
22. .064 by .4
23. 2.56 by .016
24. .225 by 1.5
25. 6.75 by .015
26. 22.4 by .007
27. 3.5 by .875
28. .03 by .015
29. .03 by .016
30. 72.9 by .27

31. 62.5 by .0125

32. 3.6 by .072

33. 4.5 by .018

34. .018 by 4.5

35. .5 by .008

36. 7.25 by .029

37. .819 by .0013

38. .0064 by .00025

39. 2.5 by .0008

40. 7.6 by 1900

158. Written Problems.

1. Type Problem. A boy spends .6 and .25 of his money. What decimal part of his money is left?

$$\begin{array}{r l} .6 & \\ +\ .25 & \\ \hline .85 & \text{spent} \end{array} \qquad \begin{array}{r l} 1.00 & \text{whole amount} \\ -\ .85 & \text{spent} \\ \hline .15 & \text{decimal part left.} \end{array} \quad \textit{Ans.}$$

1.00 does not mean one dollar but 100 hundredths, or the whole of his money.

2. If a boy had 80 cents and spent .6 and .25 of his money, how many cents did he have left?

3. From a piece of cloth containing 36 yd., .2 and then .55 were cut off. What decimal part of the whole length remained? How many yards remained?

4. A barrel is .65 full of oil. If its full capacity is 48 gal., how many gallons must be poured into it to fill it?

5. Edgar sold 12 *Saturday Evening Posts* at 5¢ apiece. He spent .85 of this money. How much money did he have left?

6. $(200 - .02) \div 9 = ?$

7. Find the product of one thousand and one thousandth.

8. What is the cost of three fields, the first containing 3.4 acres, the second 5.75 acres, and the third 4.065 acres, at $64 an acre?

9. In the Borough of Manhattan, New York City, there are 150 public schools. In the Borough of Brooklyn there are $.16\frac{2}{3}$ more. How many schools are there in Brooklyn?

Reduce the complex decimal to a common fraction.

10. Type Problem. John's older brother earns $16 a week. If he spends $10 a week, what decimal part of his earnings does he spend?

$10 = $\frac{10}{16}$ of $16.

Reduce to lowest terms: $\frac{10}{16} = \frac{5}{8}$.
Reduce $\frac{5}{8}$ to a decimal: 8)5.000
.625 *Ans.*

11. 6 yd. were cut from a piece of ribbon containing 18 yd. What decimal part remained?

12. What decimal part of 3 bu. is 12 qt.?

13. What decimal part of an hour is 21 minutes?

14. What decimal part of $16.50 is $.66?

15. Our class register is 48. The average attendance last month was 45. The attendance was what decimal part of the register?

16. What decimal part of 8 gal. is 2 qt. 1 pt.?

17. James has 16 marbles, Frank has 8, and Max has 26. What decimal part of the total does each boy have?

FRACTIONAL PARTS OF A DOLLAR

159. Oral Exercises.

1. At $.50 each, find the cost of
12 yd. of ribbon
16 books
21 pairs of stockings
7 lb. of candy
9 baseballs
15 pencil boxes
3 neckties
30 dolls

2. At $.25 each, find the cost of
12 pictures
7 boxes of crayons
16 penknives
5 hair ribbons
3 bats
8 lb. of candy
22 yd. of lace
15 lb. of crackers
10 lb. of coffee
25 gal. of gasoline

3. At $\$.12\frac{1}{2}$, find the cost of

16 yd. of calico
24 combs
30 rulers
44 paper boxes
12 qt. of oil
10 doz. buttons (at $\$.12\frac{1}{2}$ a doz.)
14 lb. of rice
20 handkerchiefs
80 oz. of spice
56 pieces of braid
25 lamp chimneys
6 collars

4. At $\$.16\frac{2}{3}$, find the cost of

30 doz. eggs
45 lb. of meat
120 yd. of rope
51 ft. of pipe
84 bu. of sawdust
27 lb. of cheese
33 qt. of apples
15 gal. of vinegar
54 pieces of ribbon
3 pt. of ice cream

5. At \$1.20, find the cost of

25 caps
40 baskets of grapes
15 crates of peaches
10 pairs of shoes
45 cameras
5 yd. of silk
20 pairs of gloves
35 gal. of ice cream
75 doz. handkerchiefs
30 yd. of cloth

6. At $\$1.66\frac{2}{3}$, find the cost of

3 umbrellas
6 gross of pencils
30 gal. of varnish
24 gross of buttons
36 pairs of gloves
18 doz. cans of corn
12 bu. of seed
9 cases of eggs
15 pieces of lace
21 crates of tomatoes

7. Multiply the following, using a fraction of a dollar instead of the number of cents:

$150 \times \$.33\frac{1}{3}$
$16 \times \$1.12\frac{1}{2}$
$18 \times \$.66\frac{2}{3}$
$24 \times \$1.12\frac{1}{2}$
$330 \times \$.33\frac{1}{3}$
$270 \times \$.66\frac{2}{3}$
$80 \times \$.75$
$36 \times \$.66\frac{2}{3}$
$210 \times \$.33\frac{1}{3}$

57 × $ .16⅔
55 × $1.20
72 × $ .33⅓
160 × $ .25

100 × $3.20
40 × $2.12½
9 × $ .66⅔
24 × $1.66⅔

12 × $2.33⅓
324 × $ .66⅔
20 × $2.75

DENOMINATE UNITS

160. Written Exercises.

1. A woman made 3¾ gal. of catsup. How many bottles, each holding ⅔ of a pint, could be filled with it?

2. The tire of John's bicycle wheel measures 6⅔ ft. around the rim. How many times must the wheel turn around in traveling 1 mi., or 5,280 ft.?

3. How many badges, each requiring 10½ in., can be made from a piece of ribbon 4⅔ yd. long?

4. A train due to arrive at a certain station at 9.10 A.M. reached there at 10.05 A.M. How many minutes late was the train? What fractional part of an hour was this? What decimal part of an hour?

5. The school field is 234½ ft. long by 84⅔ ft. wide. Find the area of the field in square feet.

6. A fence 8 ft. high incloses this field (Ex. 5). How many square feet are there in the fence? What would it cost to paint the fence at $.00¾ a square foot?

7. How many wire nails can be made from a roll of wire containing 11⅔ yd., if each nail requires 2⅓ in. of wire?

8. A certain kind of pen costs $.50 a gross. What is the profit on a gross if the pens are sold at the rate of 6 pens for 5¢?

9. During the winter, Frank burned ¾ of a pint of kerosene oil in his lamp each night. How many nights did a 3-gallon can of oil last him?

10. A peddler bought a barrel containing $2\frac{1}{3}$ bu. of apples for \$4.25. He sold $\frac{1}{3}$ of the apples (the largest ones) for \$.15 a quart and the remainder at the rate of 3 qt. for \$.25. How much did he receive for all the apples? If his expenses in selling them were \$2.15, what was his actual profit?

BILLS

161. Written Exercises.

1. The Excelsior Laundry sends to its customers monthly bills. These are some of its prices: collars 2¢, shirts 10¢, undershirts 6¢, night shirts 10¢, handkerchiefs 2¢, towels 3¢. Make out and receipt a bill for a customer for whom the laundry did work four times during the month of March.

2. Imagine you are a clerk in the delicatessen store of J. C. Schoppaul. Make out a weekly bill for a customer, Mr. J. R. Arends, who on four different days has bought some of the following: canned soups, lunch tongue, coffee, eggs, saltines, puffed wheat, asparagus tips, and other delicatessen goods. Use the current prices.

3. The Empire Clothing Co., of Peekskill, N. Y., outfitters to men, women, and children, send Mr. Johnson a monthly bill for the following items:

2 boys' suits @ \$3.75,
1 man's suit, \$17.75,
1 doz. socks @ $12\frac{1}{2}$¢ a pair,
3 ties at the rate of 3 for a dollar,
2 pairs of girls' shoes @ \$2.75,
2 children's dresses @ \$1.75 and \$2.75,
2 hats @ \$2.75 and \$3.98.

Make out the bill and receipt it.

4. The Bolton Drug Co., 264 Fulton St., New York, sent a bill dated March 1, 1916, to George Hutchins for 1 atomizer, \$.75; prescription # 32,614, \$.60; 1 lb. absorbent cotton, \$.35, bought Feb. 15; and prescription # 38,116, \$.95; 1 bottle vaseline, \$.15, bought Feb. 23.

Make out the bill, and receipt it as paid March 10 to Jacob Seaman, a clerk, who receipted it for The Bolton Drug Co.

162. Written Problems.

1. A clerk's salary is \$15 a week. If he spends $\frac{1}{5}$ of it for rent, $\frac{1}{10}$ for clothes, and $\frac{2}{5}$ for other expenses, what does he save in a week? How much does he save in a year of 52 weeks?

2. In a school of 1,440 children, 840 are less than 10 years old. What fractional part of the school is less than 10 years of age?

3. John's kite string was 375 ft. long. In a high wind the string broke 250 ft. from the end which John held. What part of the string was lost with the kite?

4. William is to receive \$3.60 for doing a certain piece of work. How much has he earned when he completes $\frac{4}{5}$ of the work?

5. What part of the work (Ex. 4) has been completed, when William has earned \$1.05?

6. Out of a piece of cloth containing 10 yd., two skirts were made, one requiring $4\frac{1}{4}$ yd. and the other $2\frac{2}{3}$ yd. How many yards were left?

7. What would the remainder of the cloth (Ex. 6) be worth at 60¢ a yard?

8. How many hats at $\$3\frac{1}{4}$ apiece can a dealer buy with $\$87\frac{3}{4}$?

9. Last week John earned \$4.32, Edward earned \$2.88, and Oscar earned \$1.32.

(*a*) What fractional part of John's earnings were Edward's?

(*b*) What fractional part of Edward's earnings were Oscar's?

(*c*) Oscar's earnings were what fractional part of John's earnings?

10. $(8.75 - 1\frac{4}{5}) \div 1.39 = ?$

11. 2.4 is $\frac{2}{5}$ of what number?

12. Mary has $2.36 in the school bank. If from now on she deposits 33 cents a week and draws out nothing, how many weeks will pass before she has $5 in the bank?

13. John has $3.36 in the bank. If he deposits 22 cents a week and draws out nothing, how much will he have at the end of 7 weeks?

14. Which would have the larger sum in 7 weeks: Mary or John (Exs. 12, 13)? How much larger?

15. A boy covers $2\frac{1}{6}$ ft. in one step. How many steps would he take in going 260 ft.?

16. A cubic foot of water weighs $62\frac{1}{2}$ lb. A cubic foot of ice weighs $57\frac{1}{2}$ lb. What fraction of the weight of a cubic foot of water is the weight of a cubic foot of ice?

17. A man had $87.15. With $\frac{2}{3}$ of his money he bought 166 lb. of tea. How much did he pay per pound for the tea?

18. How many pounds could he have bought if he had invested all of his money in the tea (Ex. 17)?

19. Mr. Hart bought a barrel of vinegar containing 63 gal., at $.09 per quart. 6 qt. leaked out. For how much must the remainder be sold in order to make a profit of $9.30 on the whole?

20. Mrs. Cox bought $16\frac{2}{3}$ yd. of velvet at $\$2\frac{1}{4}$ per yard and had $\$9\frac{3}{4}$ left. How much money did she have at first?

21. A man divided a certain sum of money among his three sons. He gave \$$27\frac{3}{5}$ to the oldest and twice that amount to the second son. The third received $\frac{1}{3}$ as much as the second. How much money did the father divide?

22. Find the cost of 74 qt. of vinegar at \$.18 a gallon.

23. A farmer exchanged 35 sheep worth \$$15\frac{2}{5}$ each for cows worth \$77 each. How many cows did he receive?

24. $(25.3 - .764) \div (.125 \times 48) = ?$

25. The school children sold 602 tickets for an entertainment. $\frac{4}{7}$ of the tickets were for children and cost \$.15 each; the remainder were for adults and cost \$.20 each. How much money was received from the sale of the tickets?

26. A dealer buys chairs at \$$4\frac{7}{8}$ apiece and sells them at \$$6\frac{1}{2}$ apiece. How many chairs must he sell to make a profit of \$$22\frac{3}{4}$?

27. A launch can go $32\frac{3}{5}$ miles in 3 hours. How long will it take to travel 81 miles?

28. How many times can a pitcher holding $1\frac{7}{8}$ qt. be filled from a pail containing $11\frac{1}{4}$ qt.?

29. What is the shortest way of multiplying a decimal by 10? By 100?

30. What is the shortest way of dividing a decimal by 10? By 100?

31. What is the effect of annexing a naught at the right of a decimal?

32. What is the effect of removing a naught from the right of a decimal?

33. What is the effect of dividing both numerator and denominator of a fraction by the same number?

34. What is the effect of multiplying both dividend and divisor by the same number?

163. Written Exercises.

THE SPRING WATER COMPANY

1. A spring water company in a large city has 9 drivers who distribute the water in large bottles to the customers. Each driver averages 120 stops a day and leaves on the average one bottle for each customer. How many bottles are distributed by these drivers each day?

2. How much does the company receive from the sale of the water each week, if the price is 50 cents a bottle?

3. The drivers each receive a salary of $15 a week and a commission of $1.10 on every 100 bottles sold. What is each driver's total income for the week, at that rate?

4. If a driver's sales decrease two ninths, how much will he lose from a week's salary?

5. If a driver's sales increase one third, what would be his total income for a week?

6. Each delivery automobile consumes 15 gallons of gasoline a day. If gasoline costs 25¢ a gallon, how much does the company pay per week for gasoline?

7. What is the company's weekly expense for salaries, commissions, and gasoline?

COMPLETE MULTIPLICATION TABLE

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

Use the Complete Multiplication Table in the following manner:

We wish to know the product of 4 times 6.

Move a pencil down the first (left-hand) column until you come to 4 (fourth line).

Then move the pencil to the right along this line until you come to column 6, where you find 24, which is the product of 4 times 6.

TABLES OF MEASURES

Table of Time

60 seconds (sec.) = 1 minute (min.)
60 minutes = 1 hour (hr.)
24 hours = 1 day (da.)
7 days = 1 week (wk.)
365 days = 1 common year (yr.)
366 days = 1 leap year
12 months (mo.) = 1 year

Table of Length

12 inches (in.) = 1 foot (ft.)
3 feet = 1 yard (yd.)
5½ yards = 1 rod (rd.)
16½ feet = 1 rod
320 rods = 1 mile (mi.)
1,760 yards = 1 mile
5,280 feet = 1 mile

Table of Liquid Measure

4 gills (gi.) = 1 pint (pt.)
2 pints = 1 quart (qt.)
4 quarts = 1 gallon (gal.)

Table of Weight

16 ounces (oz.) = 1 pound (lb.)
100 pounds = 1 hundredweight (cwt.)
20 hundredweight = 1 ton (T.)
2,000 pounds = 1 ton

Table of Dry Measure

2 pints (pt.) = 1 quart (qt.)
8 quarts = 1 peck (pk.)
4 pecks = 1 bushel (bu.)

United States Money

10 mills = 1 cent
10 cents = 1 dime
10 dimes = 1 dollar
10 dollars = 1 eagle

Table of Square Measure

144 square inches (sq. in.) = 1 square foot (sq. ft.)
9 square feet = 1 square yard (sq. yd.)
30¼ square yards = 1 square rod (sq. rd.)
160 square rods = 1 acre (A.)
640 acres = 1 square mile (sq. mi.)